

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,312,845 B2
APPLICATION NO. : 10/656469
DATED : December 25, 2007
INVENTOR(S) : Kia Silverbrook

Page 1 of 151

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

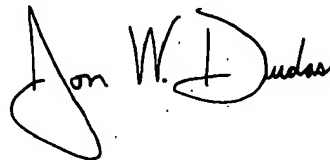
Title page, should be deleted and substitute therefor the attached title page.

Drawings:

Delete drawing sheets of 1-148 and substitute therefor the drawing sheets of 1-149 as shown on the attached pages.

Signed and Sealed this

Ninth Day of December, 2008

A handwritten signature in black ink, appearing to read "Jon W. Dudas". The signature is stylized with a large, looped initial "J" and a distinct "D".

JON W. DUDAS
Director of the United States Patent and Trademark Office

U.S. Patent

Dec. 25, 2007

Sheet 1 of 149

7,312,845 B2

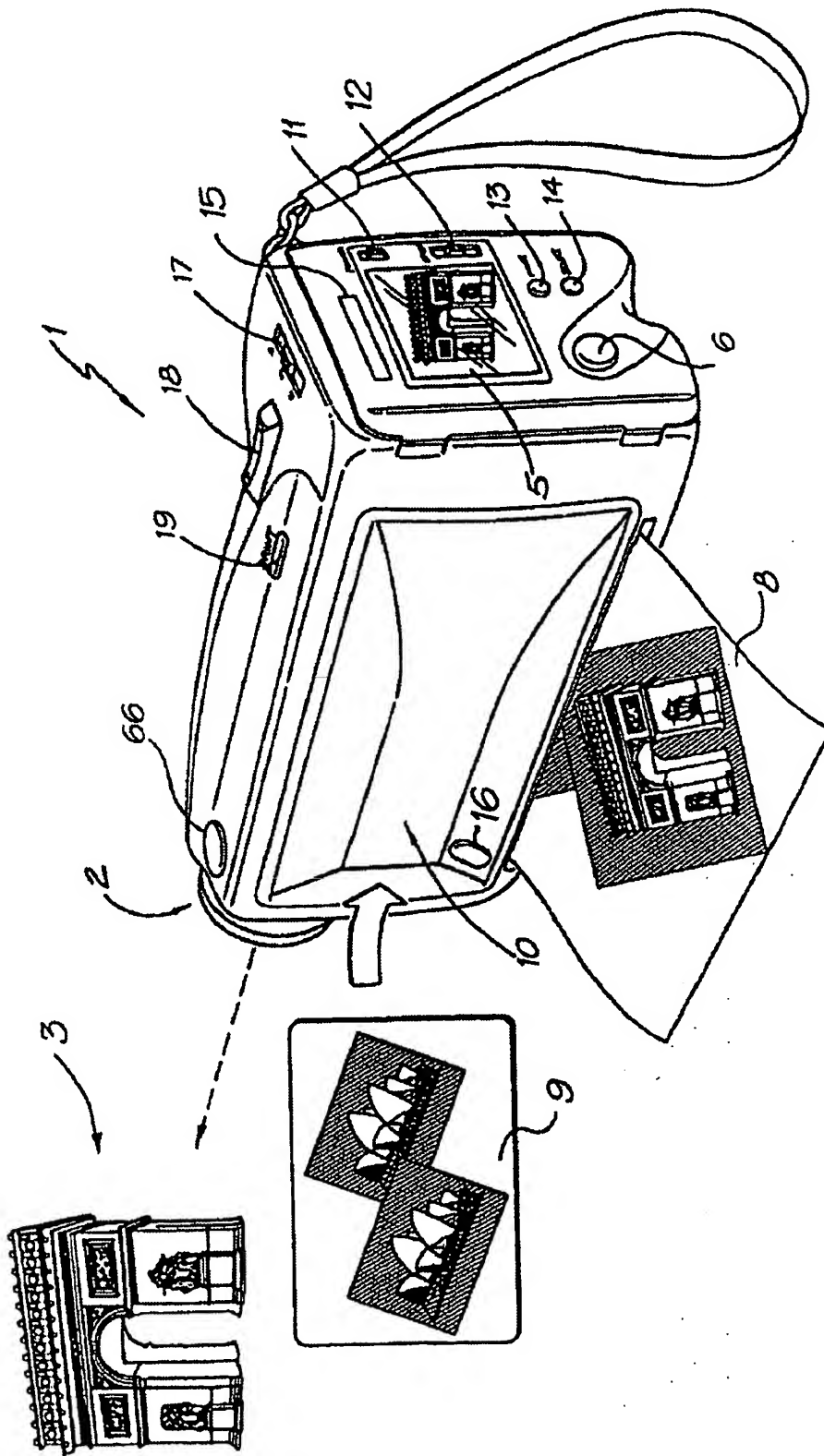


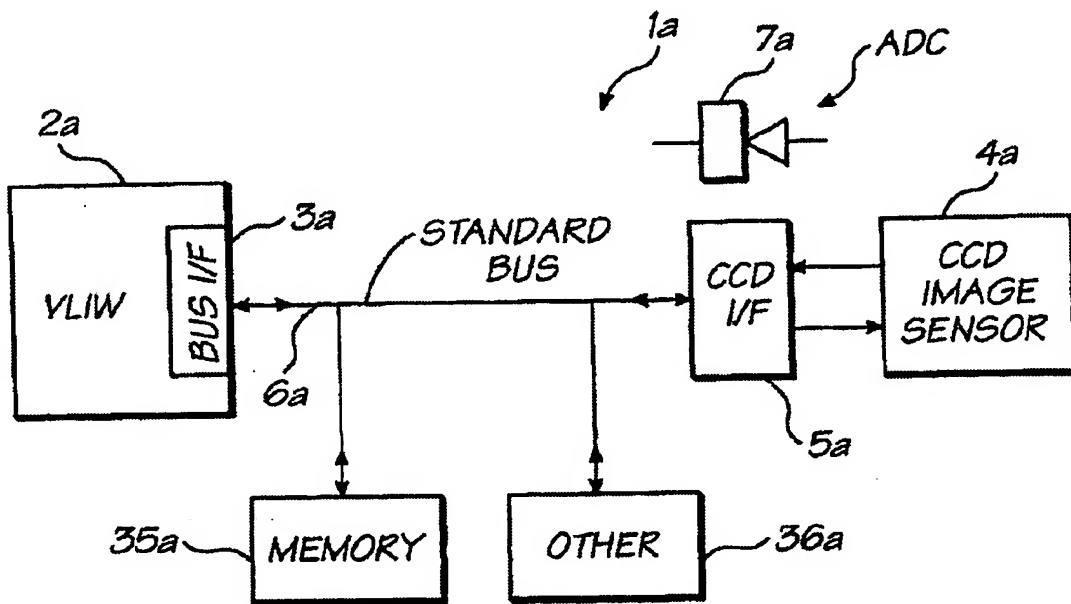
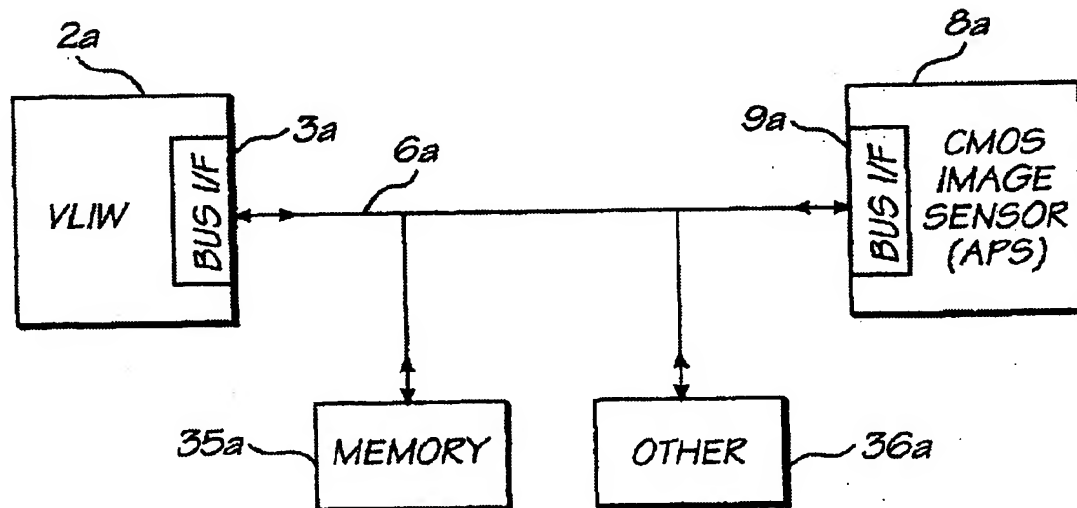
FIG. 1

U.S. Patent

Dec. 25, 2007

Sheet 2 of 149

7,312,845 B2

FIG. 1A
(PRIOR ART)FIG. 1B
(PRIOR ART)

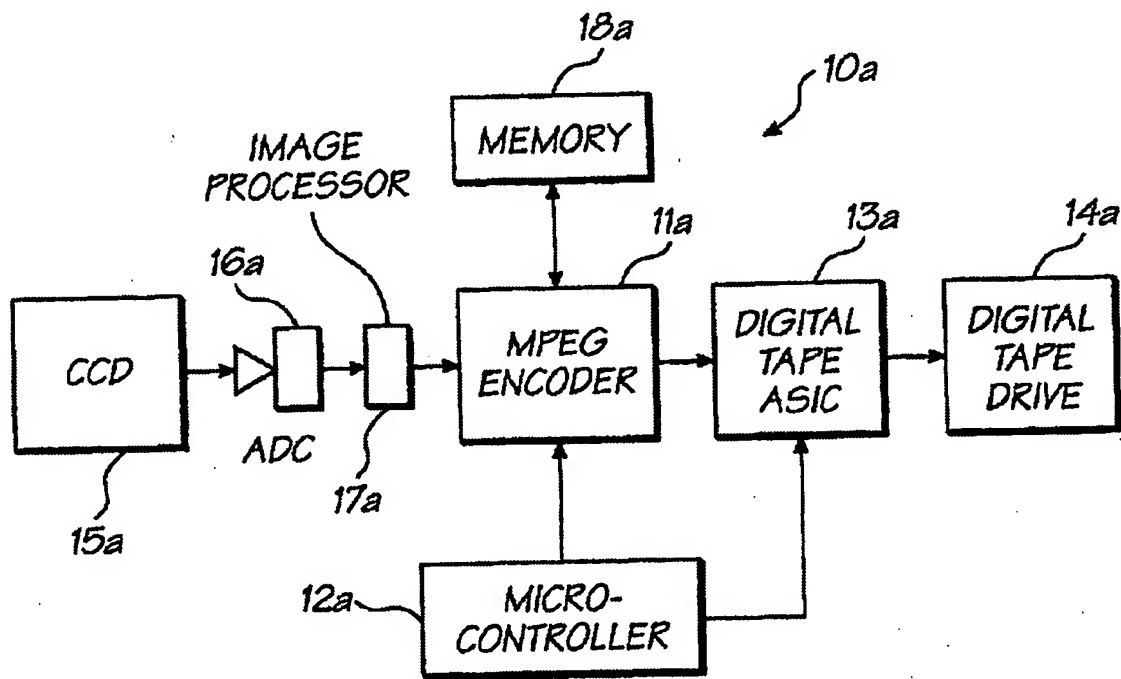


FIG. 1C
(PRIOR ART)

U.S. Patent

Dec. 25, 2007

Sheet 4 of 149

7,312,845 B2

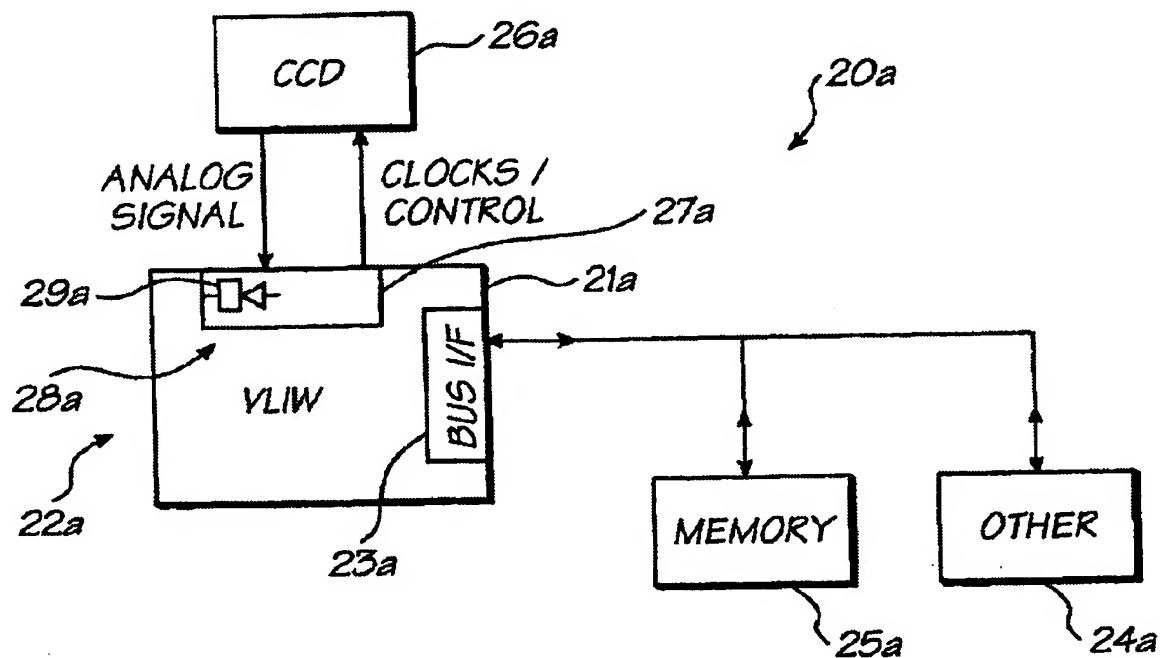


FIG. 1D

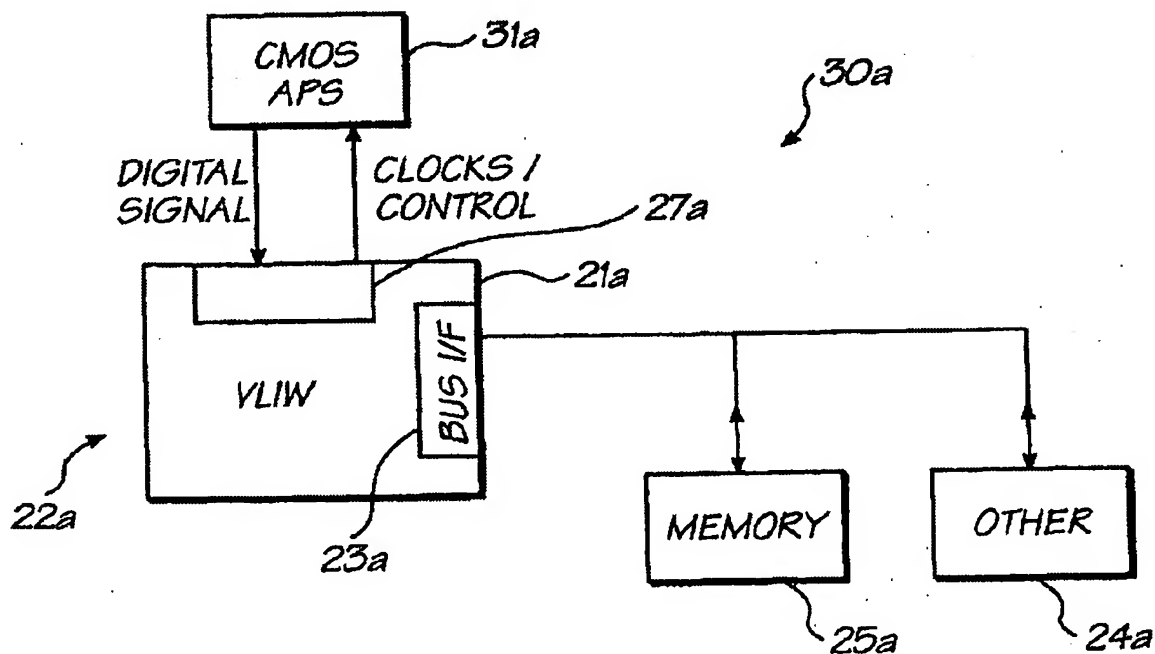


FIG. 1E

U.S. Patent

Dec. 25, 2007

Sheet 5 of 149

7,312,845 B2

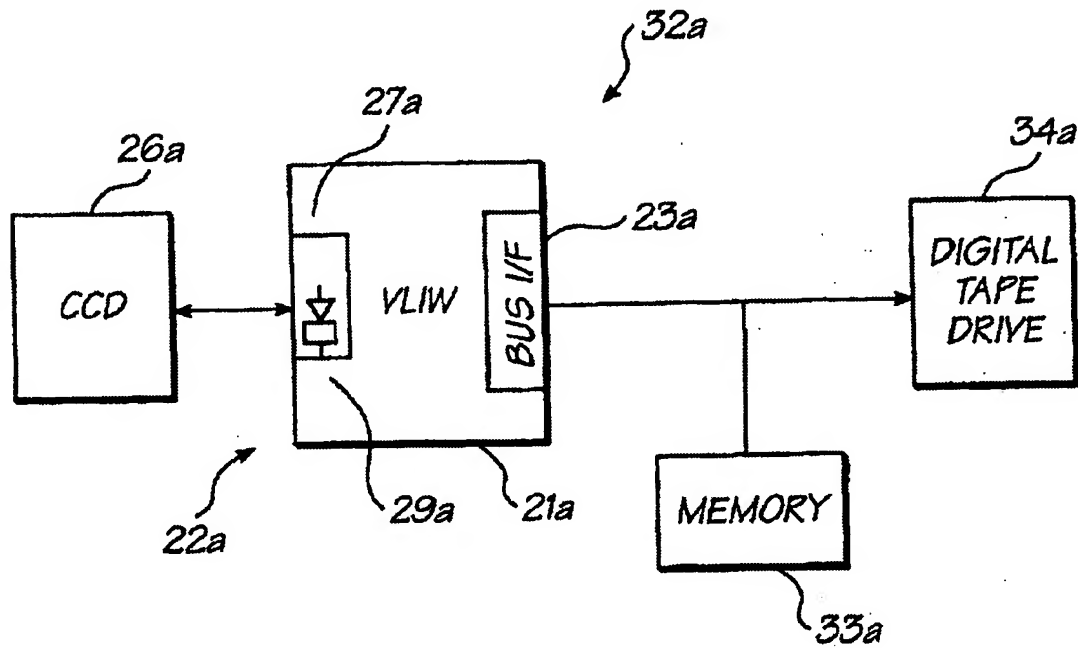


FIG. 1F

U.S. Patent

Dec. 25, 2007

Sheet 6 of 149

7,312,845 B2

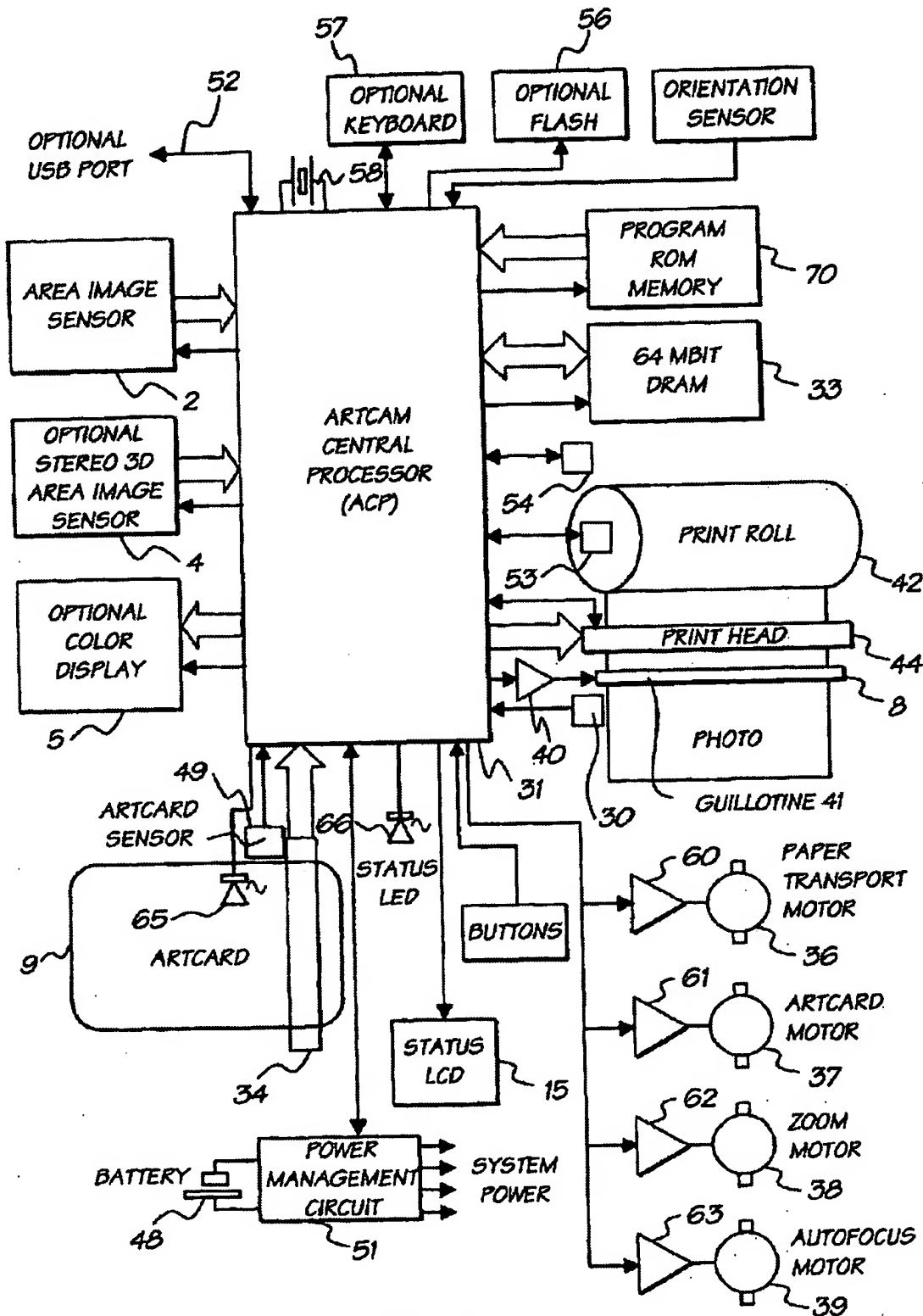


FIG. 2

U.S. Patent

Dec. 25, 2007

Sheet 7 of 149

7,312,845 B2

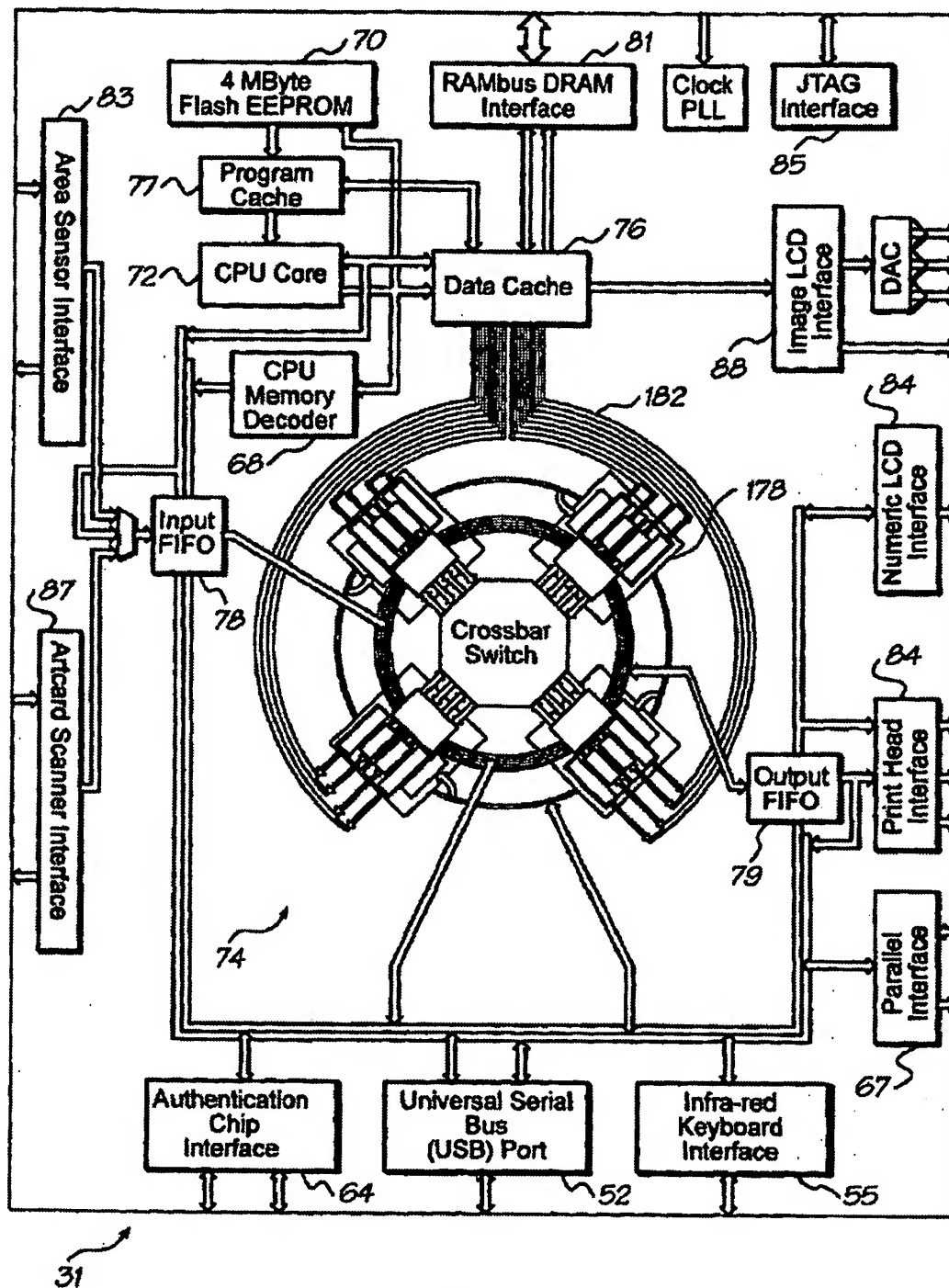


FIG. 3

U.S. Patent

Dec. 25, 2007

Sheet 9 of 149

7,312,845 B2

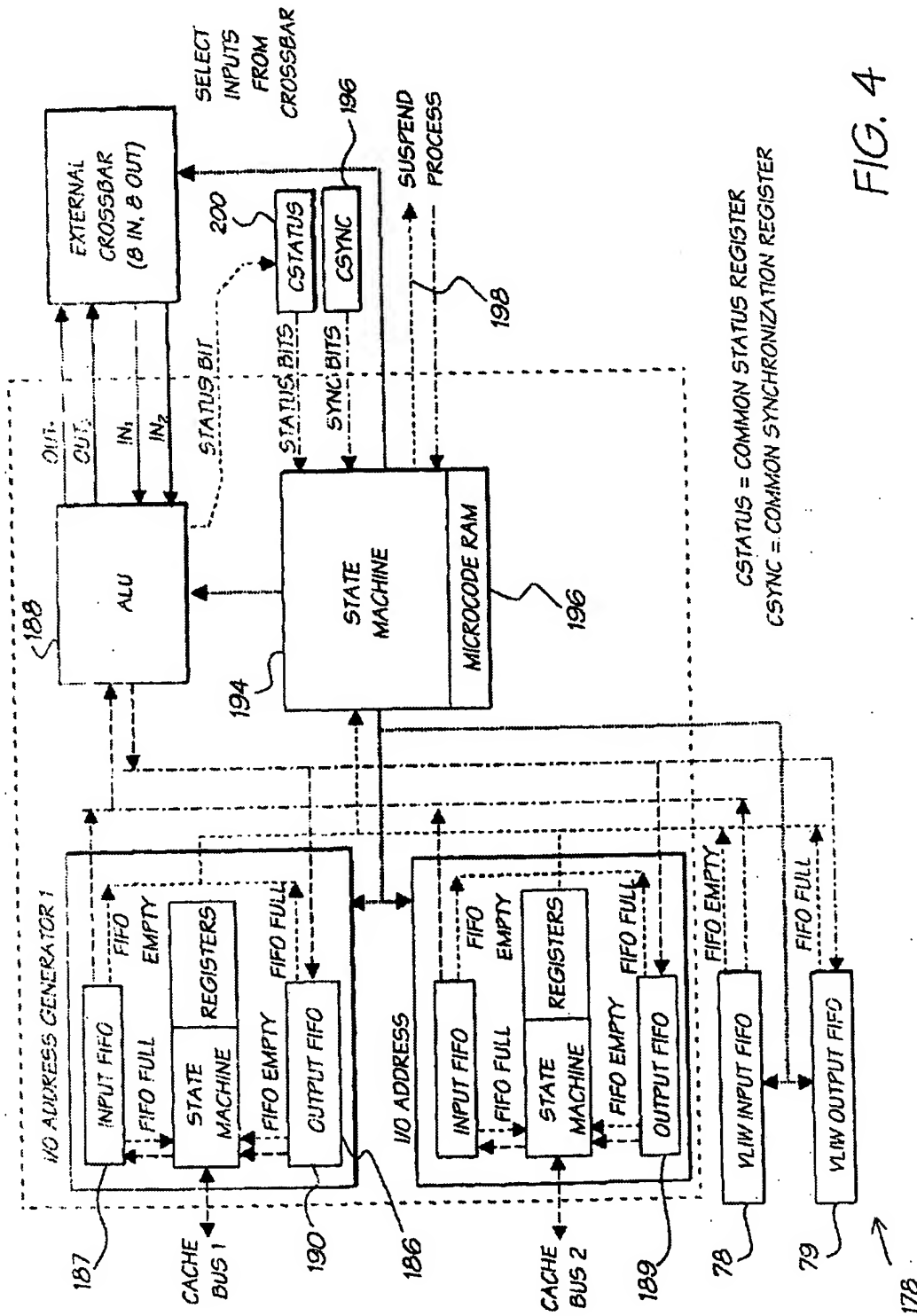


FIG. 4

U.S. Patent

Dec. 25, 2007

Sheet 10 of 149

7,312,845 B2

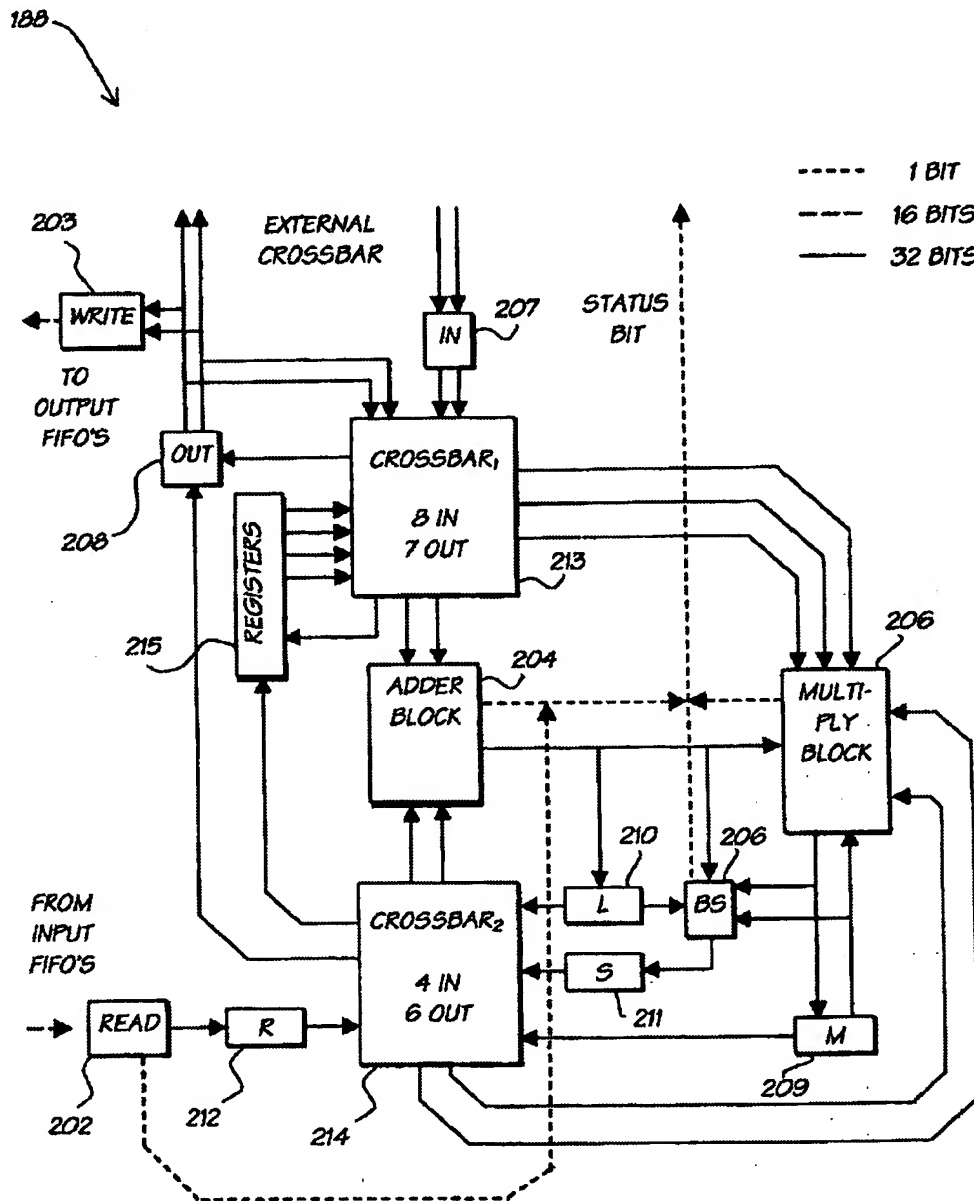


FIG. 5

U.S. Patent

Dec. 25, 2007

Sheet 11 of 149

7,312,845 B2

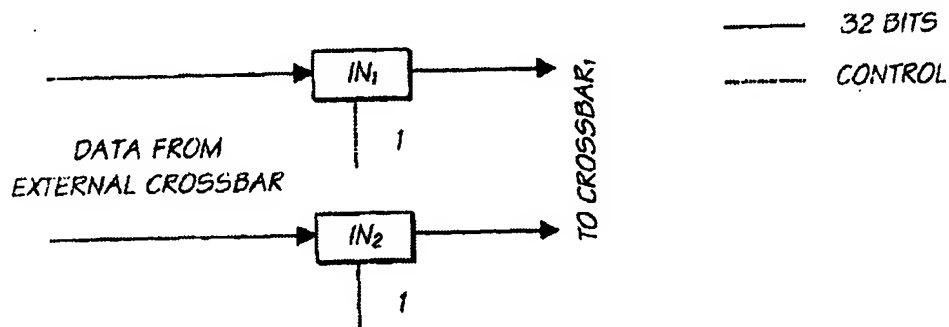


FIG. 6

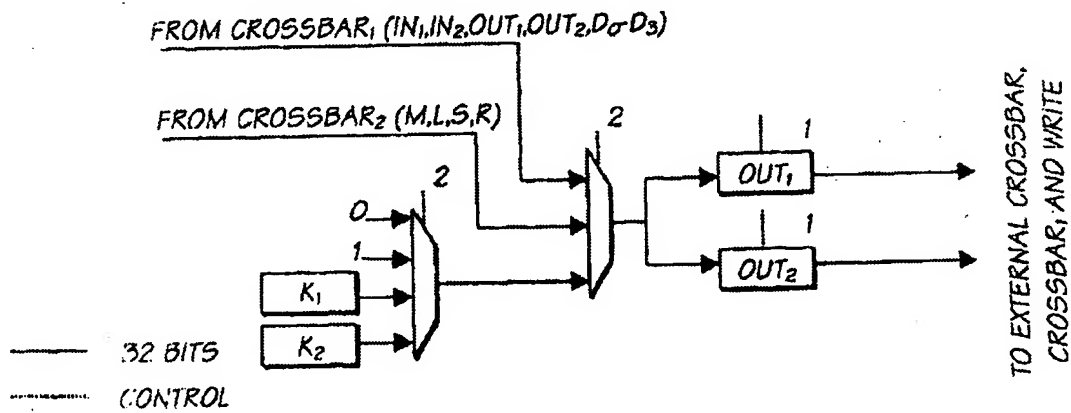


FIG. 7

U.S. Patent

Dec. 25, 2007

Sheet 12 of 149

7,312,845 B2

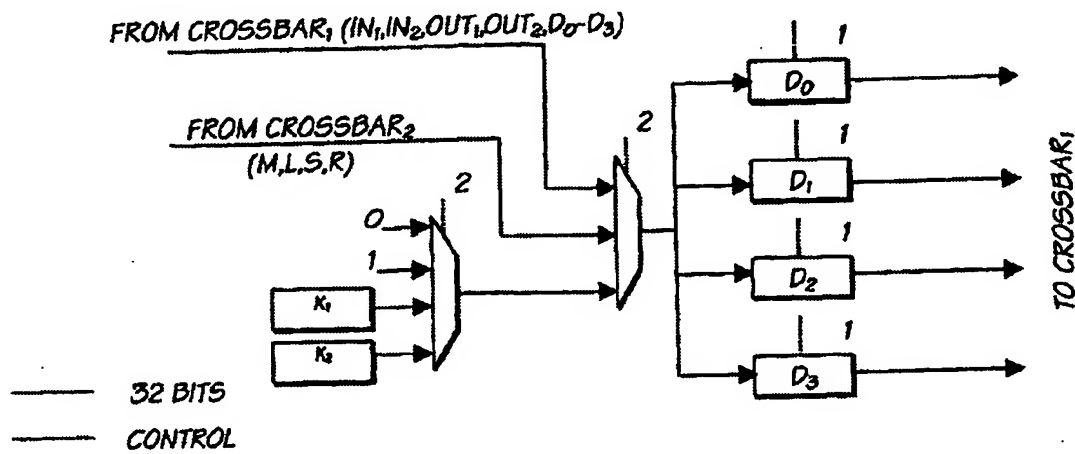


FIG. 8

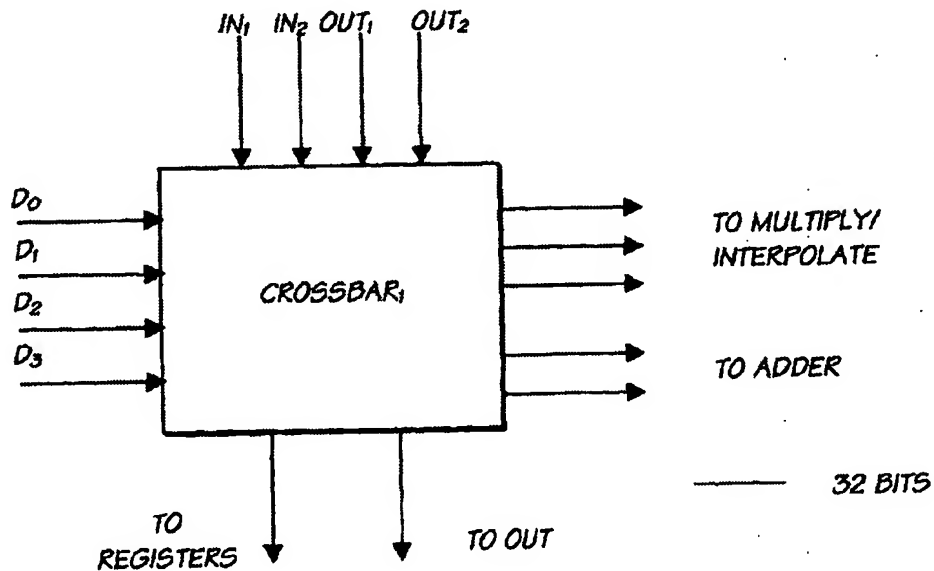


FIG. 9

U.S. Patent

Dec. 25, 2007

Sheet 13 of 149

7,312,845 B2

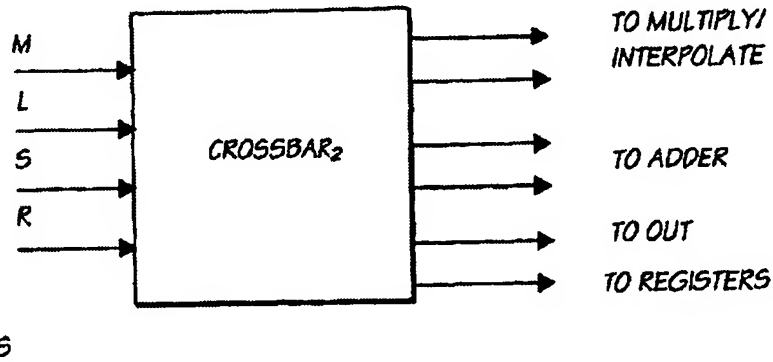


FIG. 10

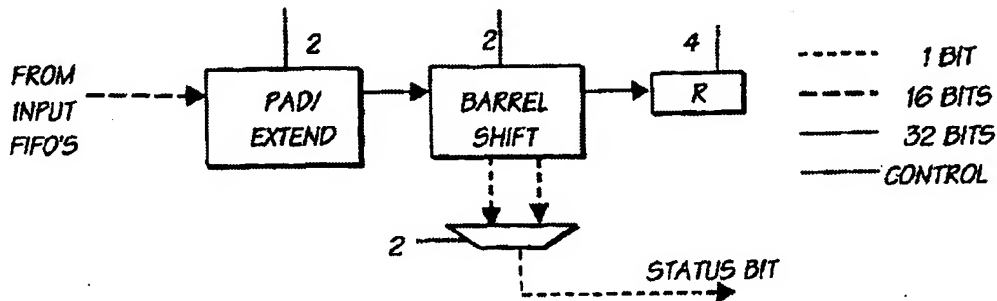


FIG. 11

U.S. Patent

Dec. 25, 2007

Sheet 14 of 149

7,312,845 B2

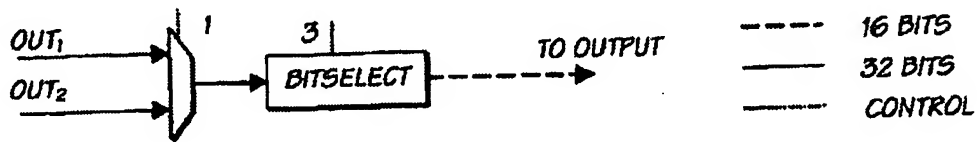


FIG. 12

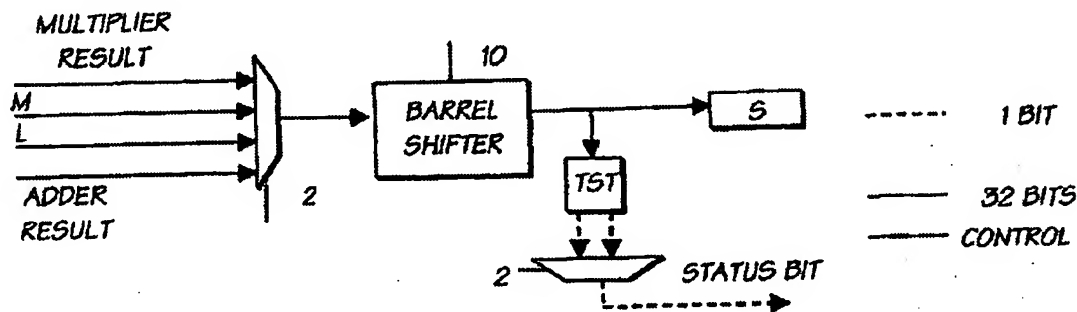


FIG. 13

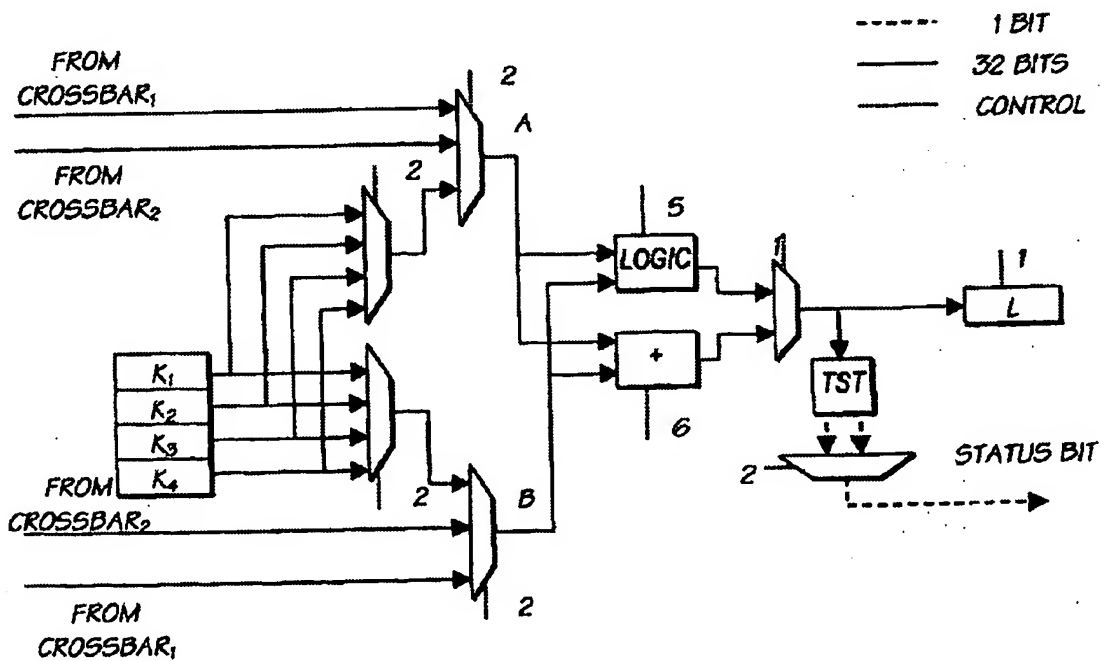


FIG. 14

U.S. Patent

Dec. 25, 2007

Sheet 15 of 149

7,312,845 B2

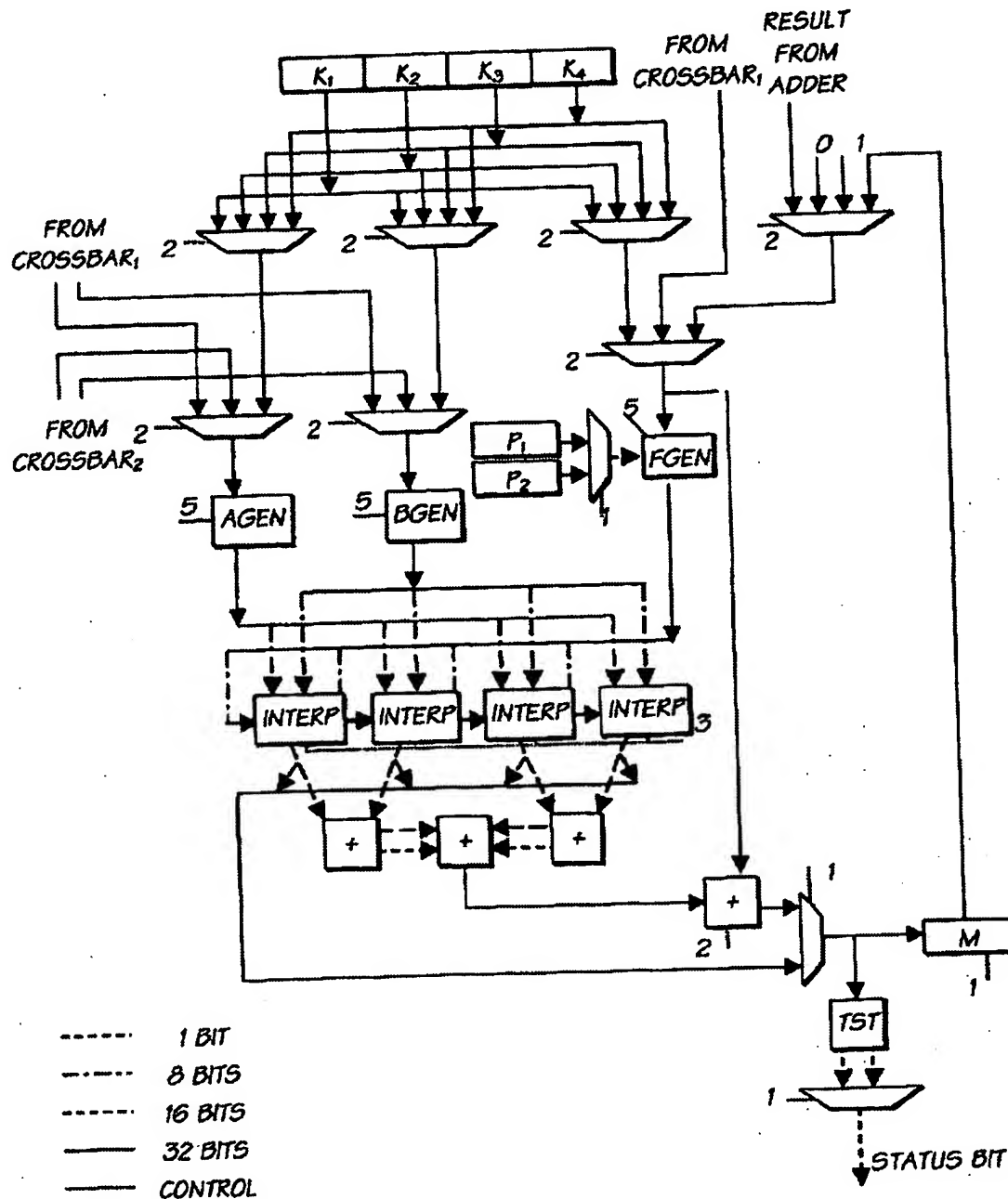


FIG. 15

U.S. Patent

Dec. 25, 2007

Sheet 16 of 149

7,312,845 B2

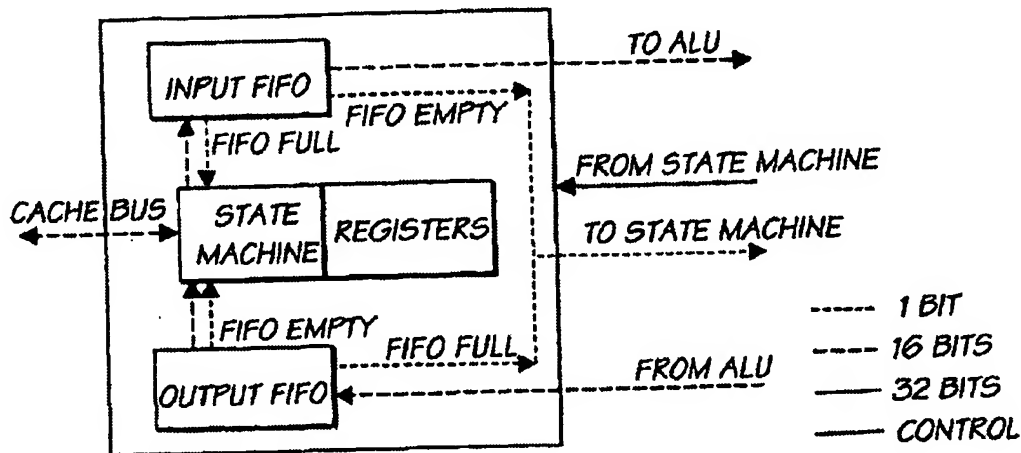


FIG. 16

ORDER OF PIXELS PRESENTED BY A SEQUENTIAL READ ITERATOR
ON A 4 X 2 IMAGE WITH PADDING.

0	1	2	3	
4	5	6	7	

FIG. 17

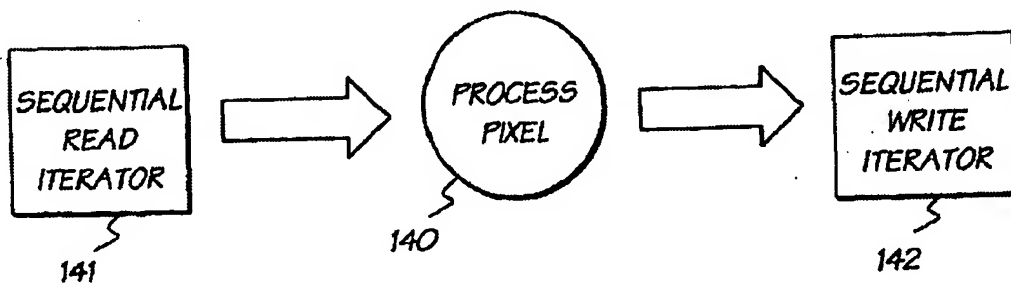


FIG. 18

U.S. Patent

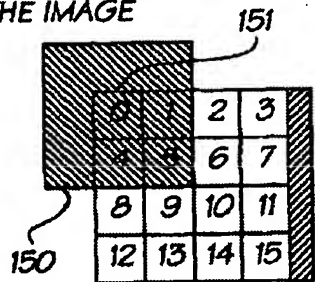
Dec. 25, 2007

Sheet 17 of 149

7,312,845 B2

A 3x3 BOX VIEW TRAVERSES THE PIXELS IN ORDER: 0, 1, 2, 3, 4, 5, 6, 7, 8
ETC, PLACING A 3x3 BOX CENTERED OVER EACH PIXEL...

3x3 BOX VIEW OF FIRST
PIXEL IN IMAGE = 9 PIXELS,
5 OF WHICH ARE OUTSIDE
THE IMAGE

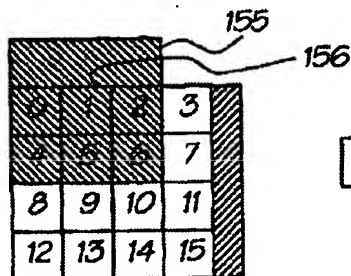


FIRST 9 PIXELS FROM THE BOX
READ ITERATOR:

IF DUPLICATION OF EDGE PIXELS IS
ON: 0, 0, 0, 0, 0, 1, 4, 4, 5

IF DUPLICATION OF EDGE PIXELS IS
OFF: V, V, V, V, 0, 1, V, 4, 5
WHERE V IS CONSTANT PIXEL
REGISTER VALUE REPRESENTING
"OUTSIDE THE IMAGE"

3x3 BOX VIEW OF
SECOND PIXEL IN IMAGE
= 9 PIXELS,
3 OF WHICH ARE
OUTSIDE THE IMAGE



SECOND 9 PIXELS FROM THE BOX
READ ITERATOR:

IF DUPLICATION OF EDGE PIXELS
IS ON: 0, 1, 2, 0, 1, 2, 4, 5, 6

IF DUPLICATION OF EDGE PIXELS
IS OFF: V, V, V, 0, 1, 2, 4, 5, 6
WHERE V IS CONSTANT PIXEL
REGISTER VALUE REPRESENTING
"OUTSIDE THE IMAGE"

FIG. 19

U.S. Patent

Dec. 25, 2007

Sheet 18 of 149

7,312,845 B2

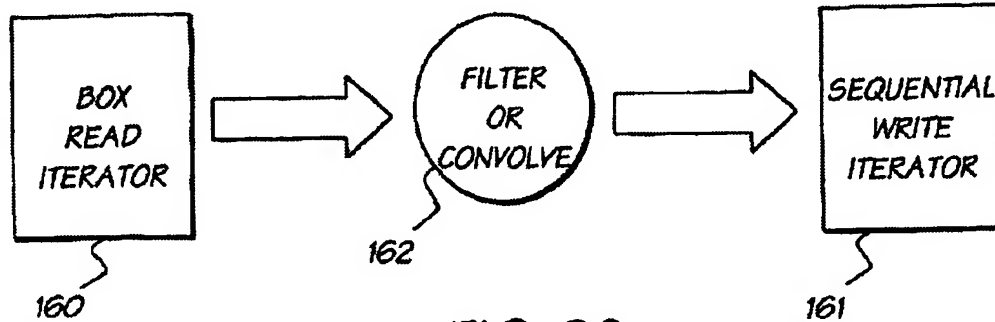
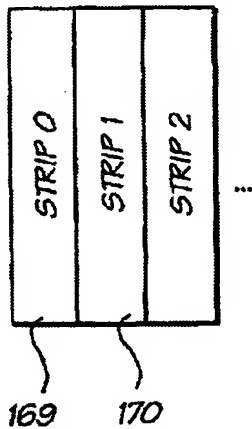
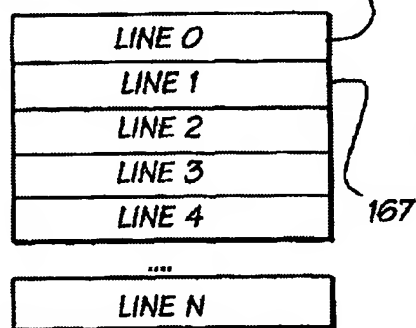


FIG. 20

IMAGE BROKEN INTO
VERTICAL STRIPS,
EACH STRIP IS 32
PIXELS ACROSS



LINES ARE ACCESSED
LINE 0 TO LINE N
WITHIN A SINGLE STRIP



PIXELS ARE ACCESSED
PIXEL 0 - PIXEL 31
WITHIN A SINGLE LINE

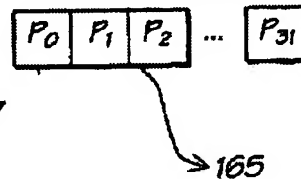


FIG. 21

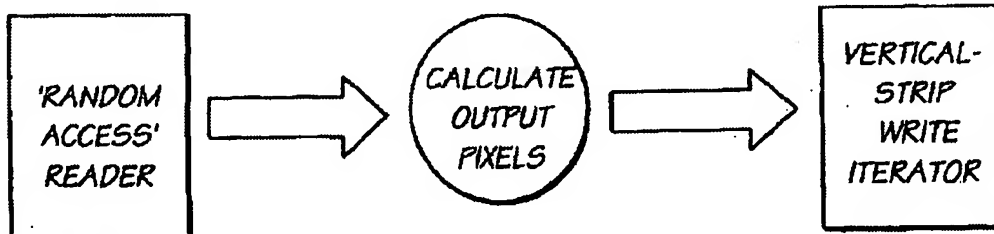


FIG. 22

U.S. Patent

Dec. 25, 2007

Sheet 19 of 149

7,312,845 B2

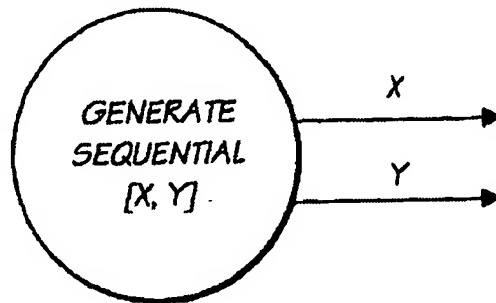


FIG. 23

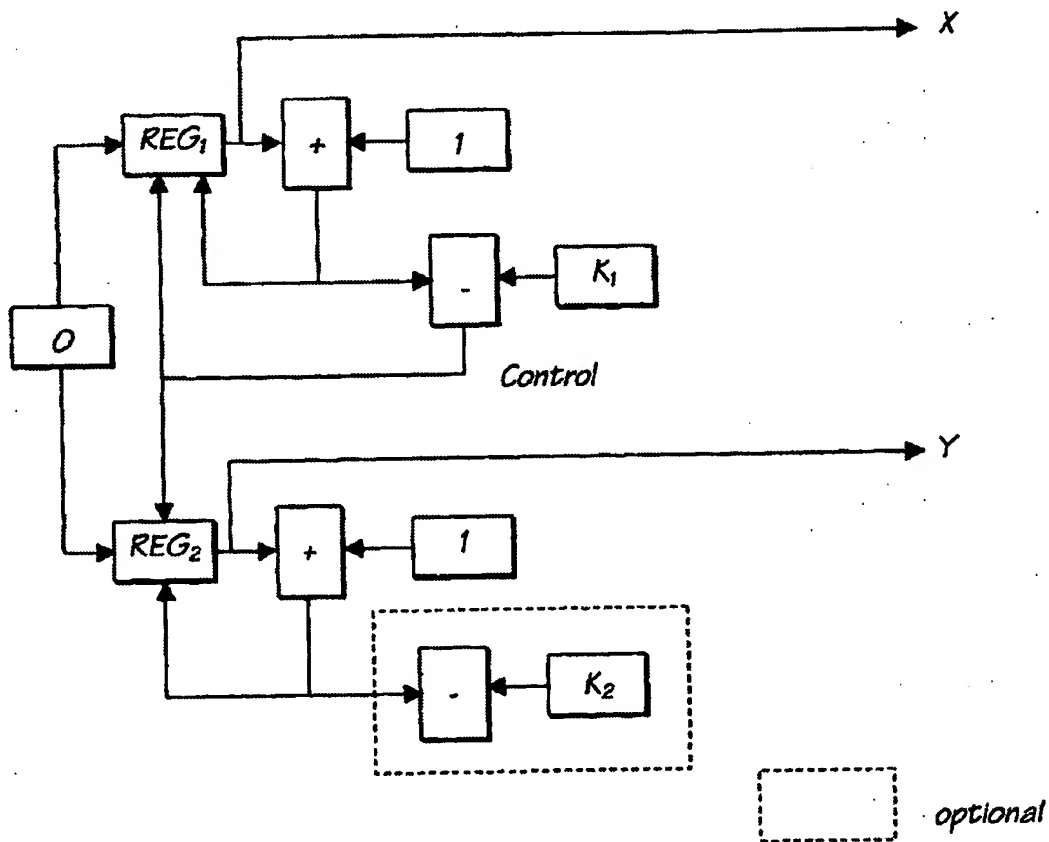


FIG. 24

U.S. Patent

Dec. 25, 2007

Sheet 20 of 149

7,312,845 B2

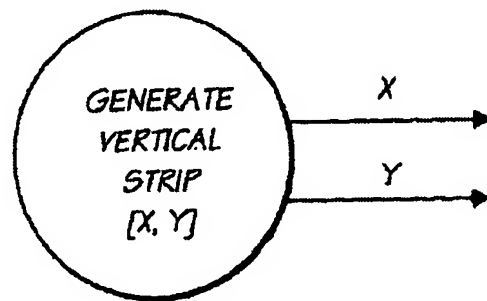


FIG. 25

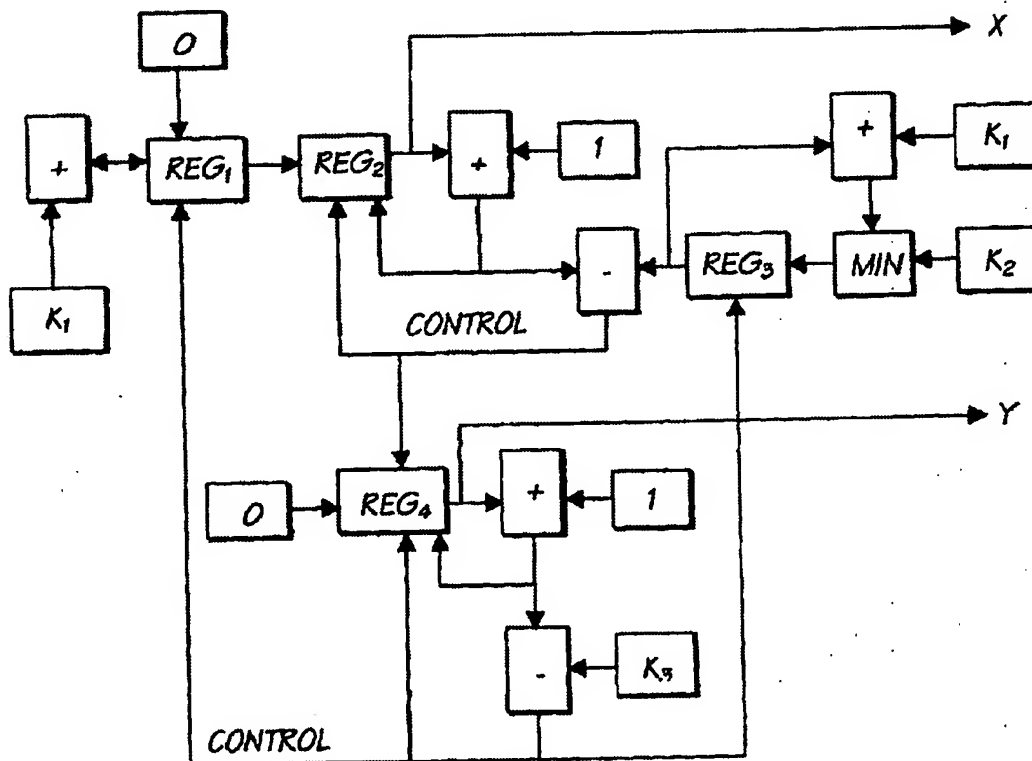


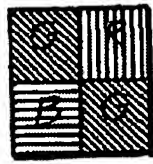
FIG. 26

U.S. Patent

Dec. 25, 2007

Sheet 21 of 149

7,312,845 B2



2X2 PIXEL BLOCK FROM SENSOR

FIG. 27

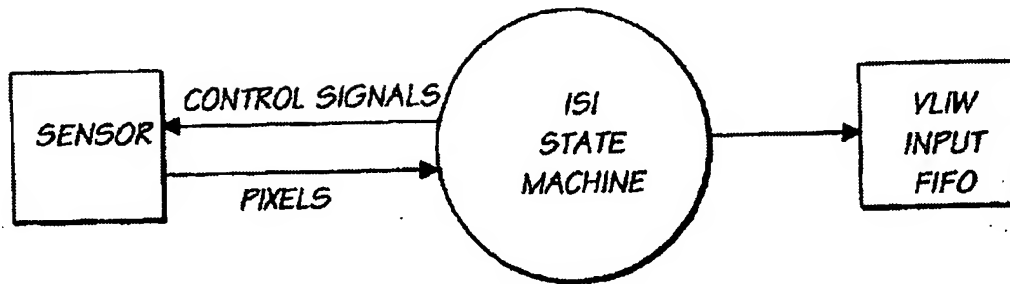


FIG. 28

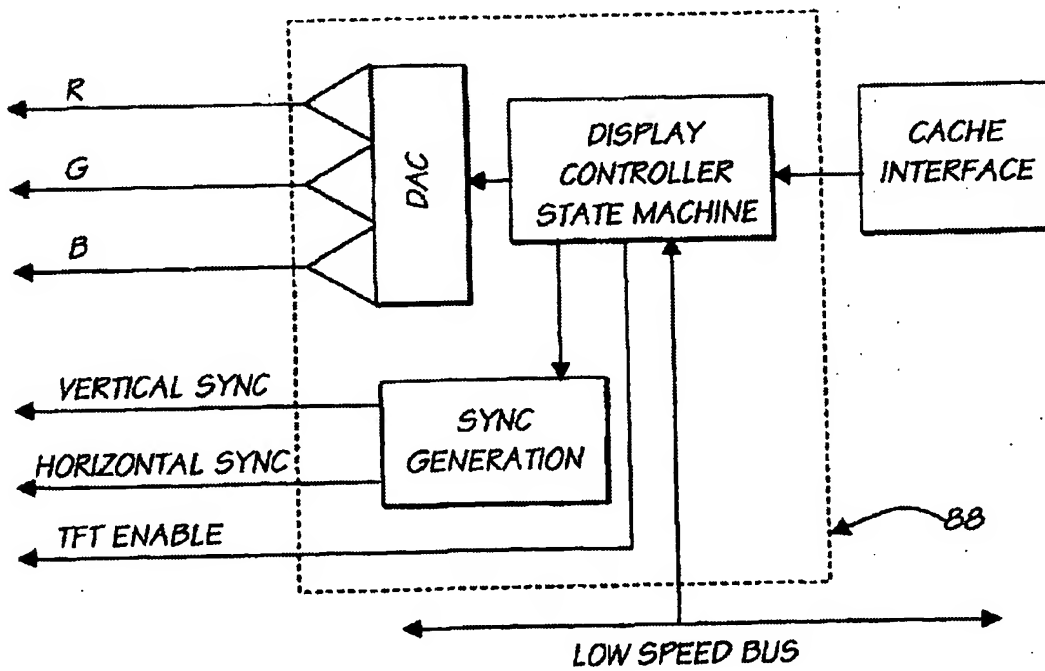


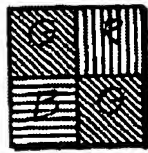
FIG. 29

U.S. Patent

Dec. 25, 2007

Sheet 22 of 149

7,312,845 B2



2X2 PIXEL BLOCK FROM CCD

FIG. 30

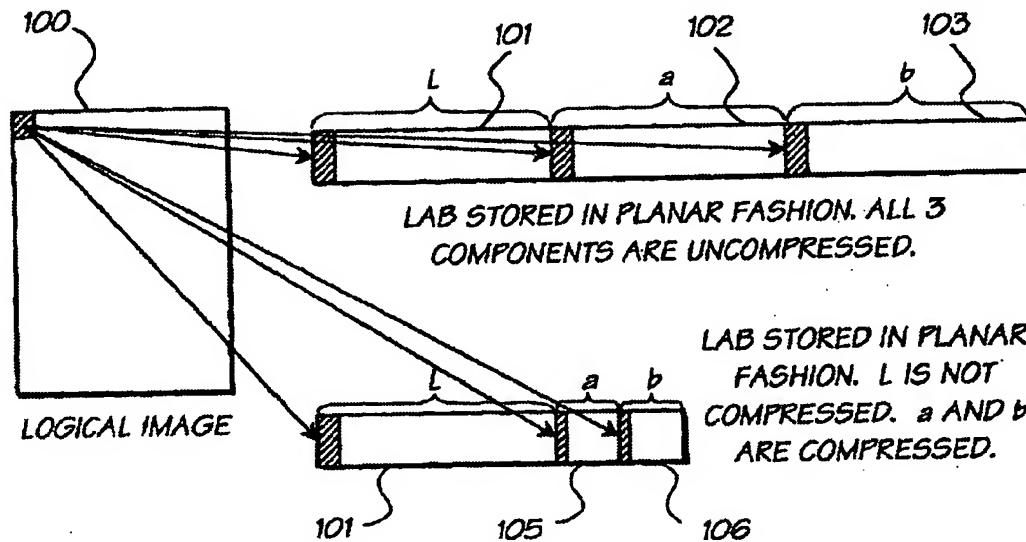


FIG. 31

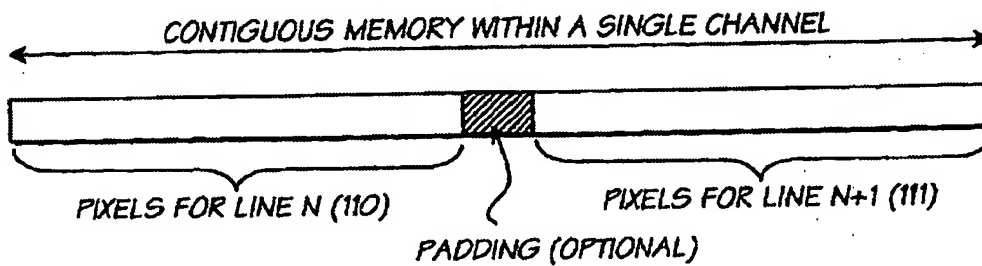


FIG. 32

U.S. Patent

Dec. 25, 2007

Sheet 23 of 149

7,312,845 B2

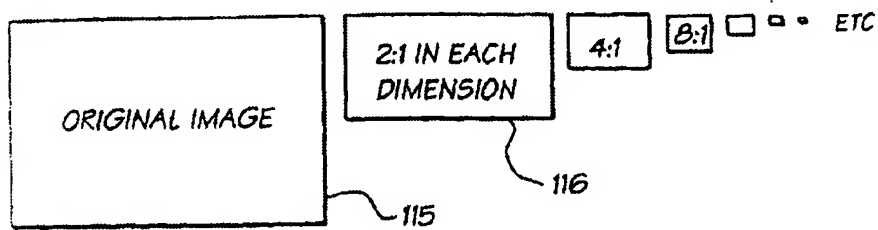


FIG. 33

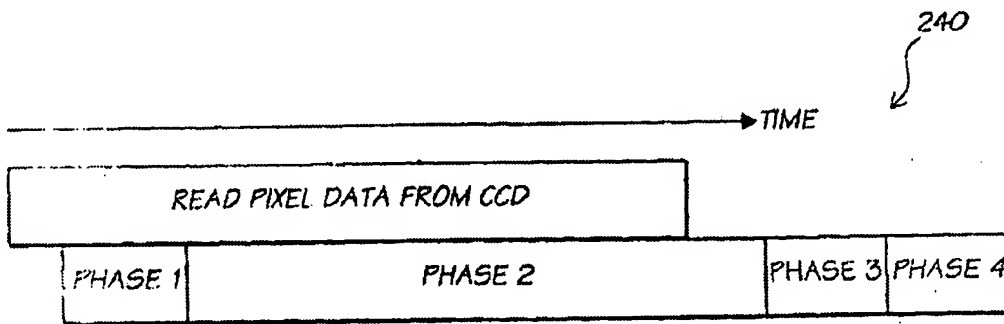


FIG. 34

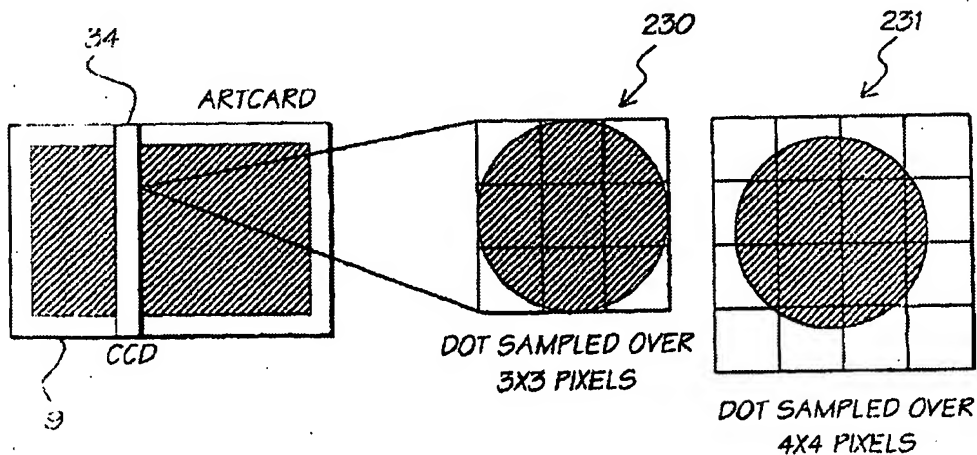


FIG. 35

U.S. Patent

Dec. 25, 2007

Sheet 24 of 149

7,312,845 B2

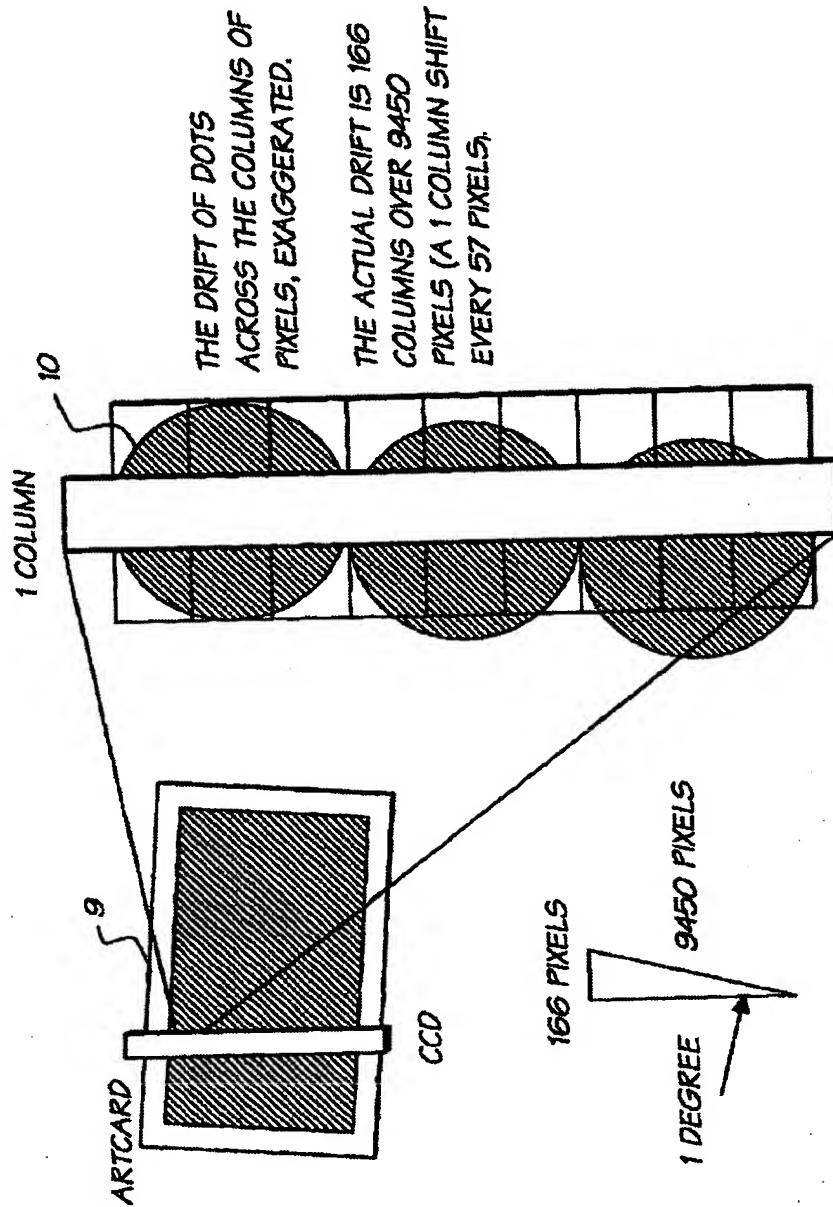


FIG. 36

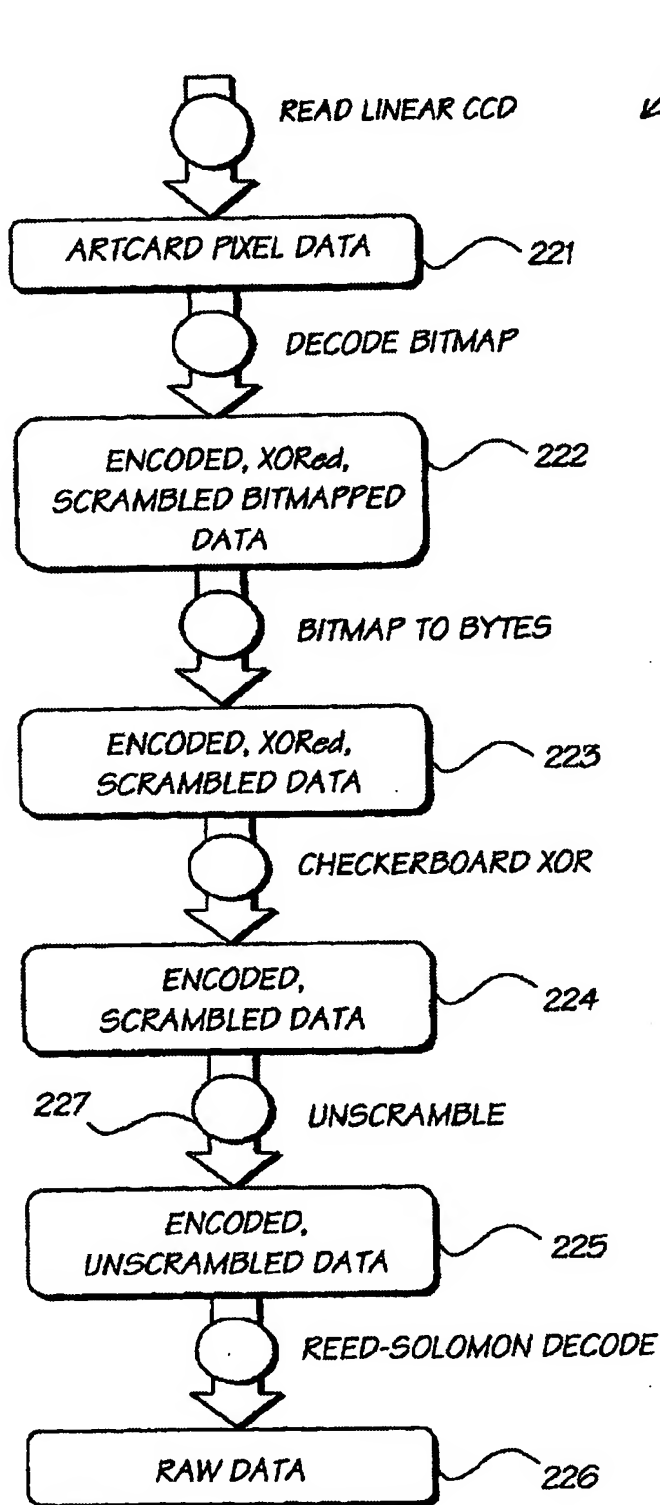
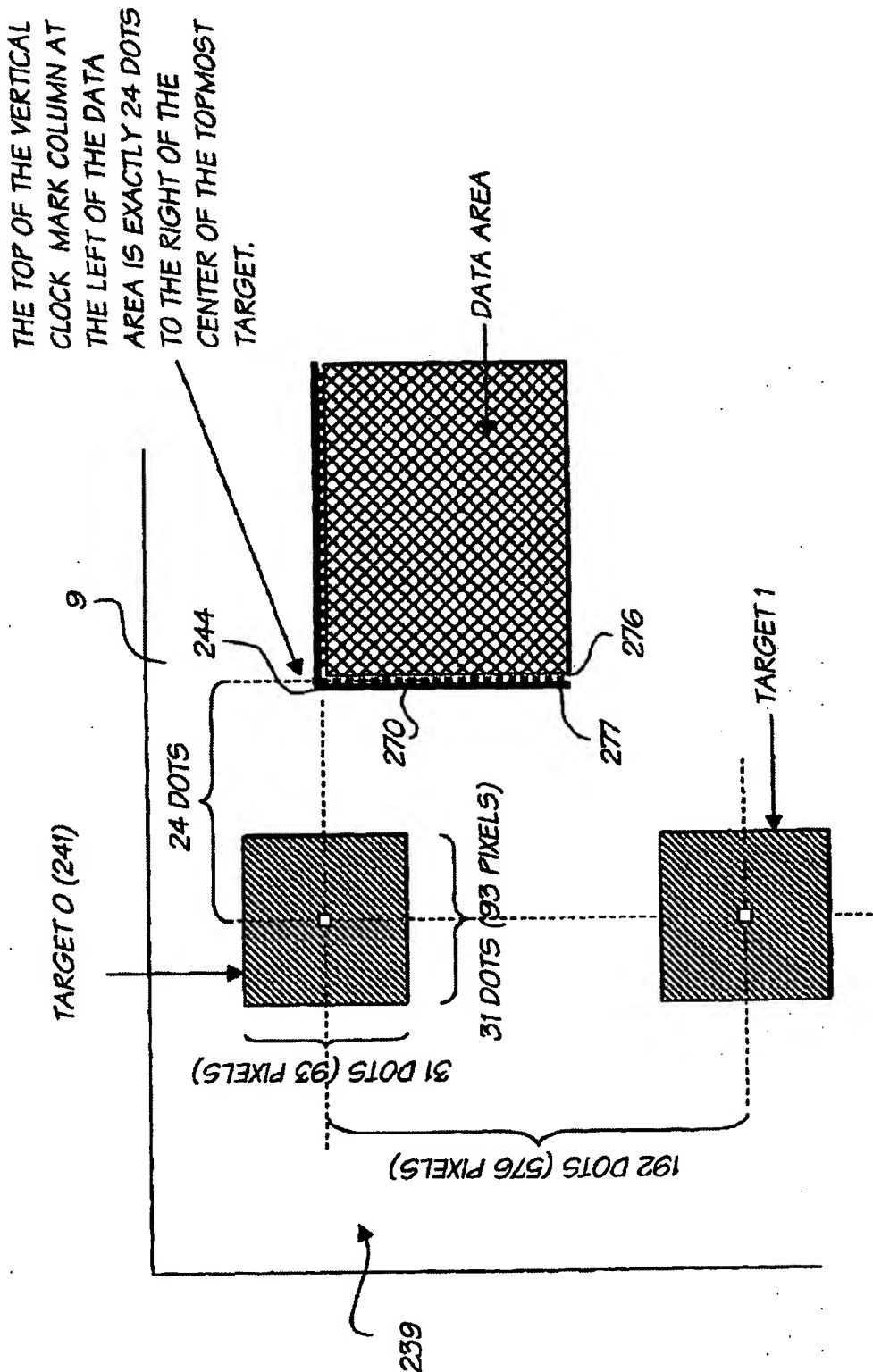


FIG. 37



U.S. Patent

Dec. 25, 2007

Sheet 27 of 149

7,312,845 B2

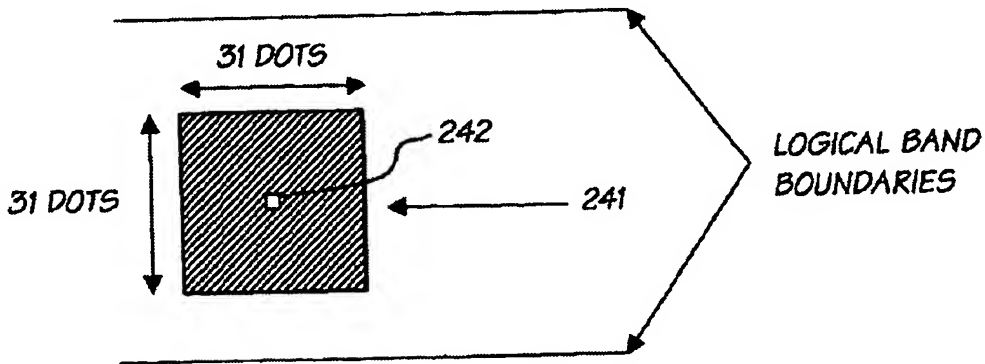


FIG. 39

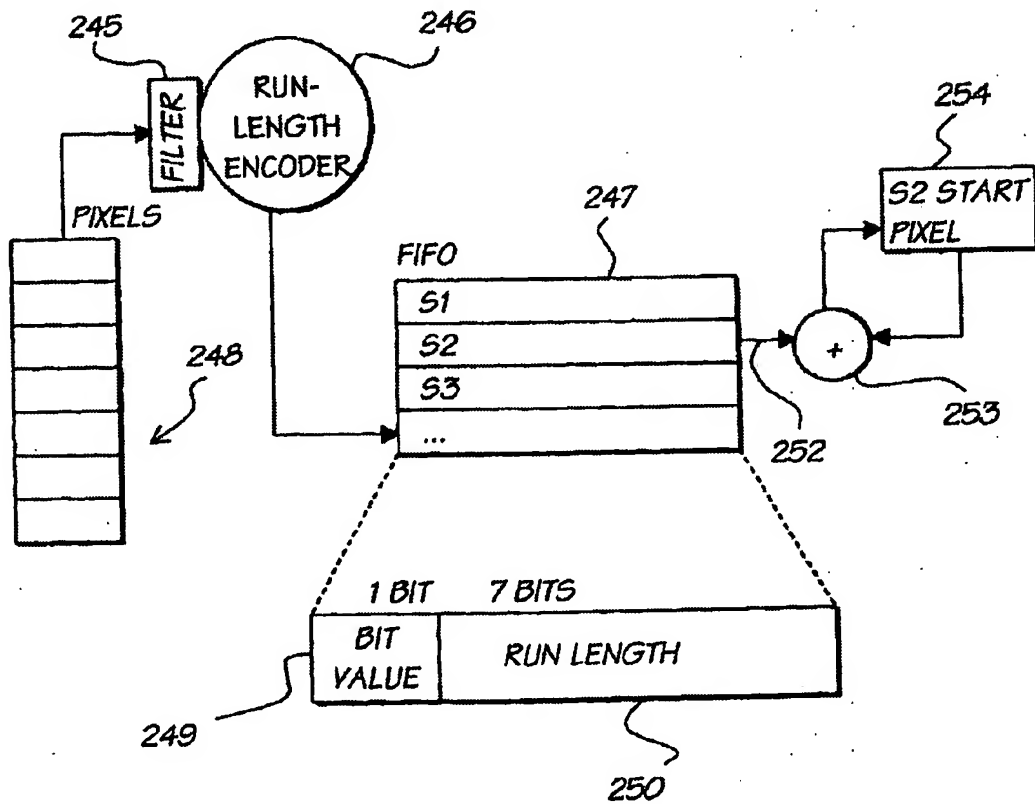


FIG. 40

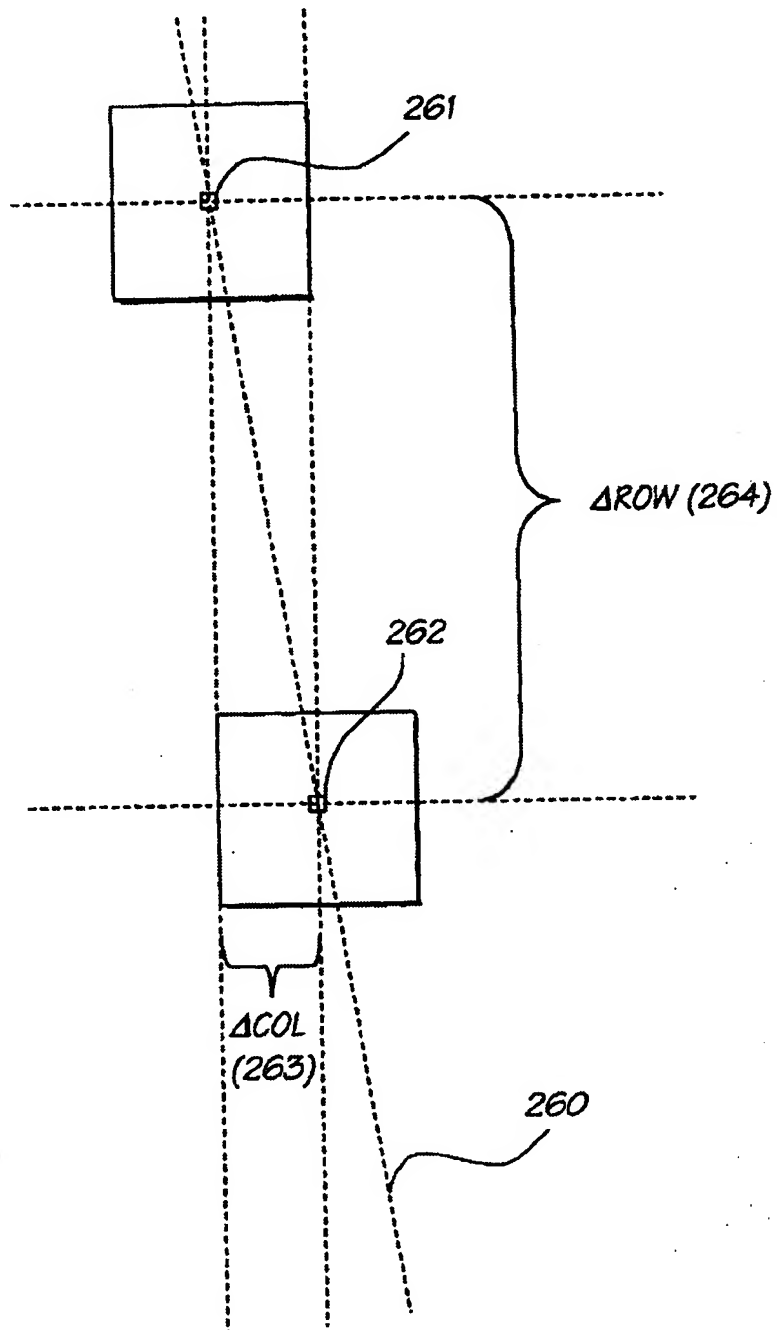


FIG. 41

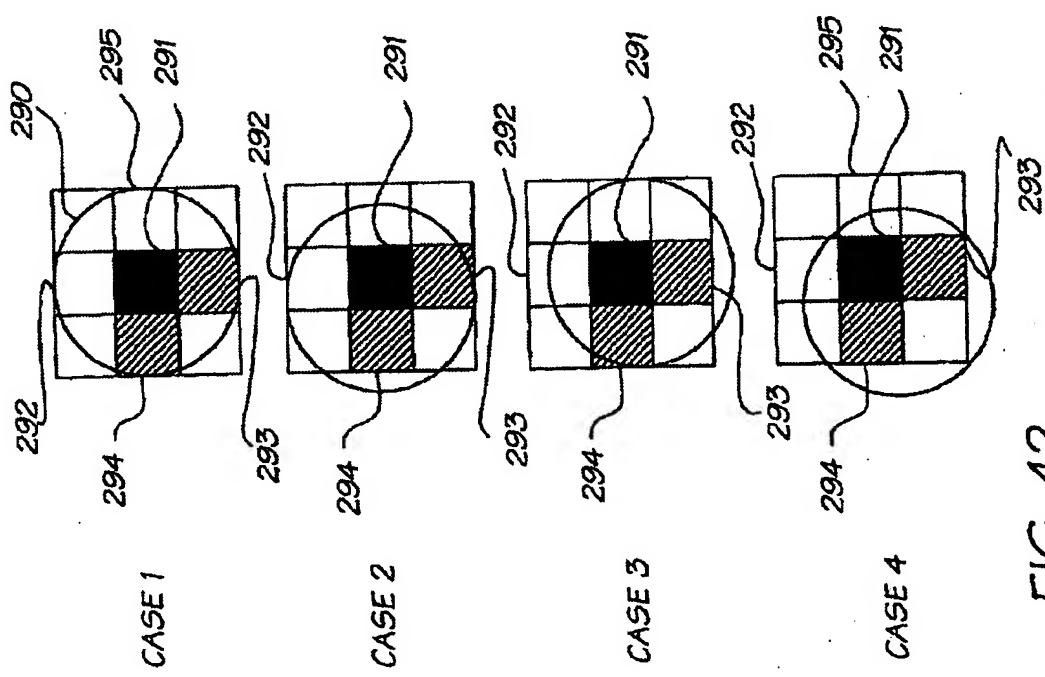


FIG. 42

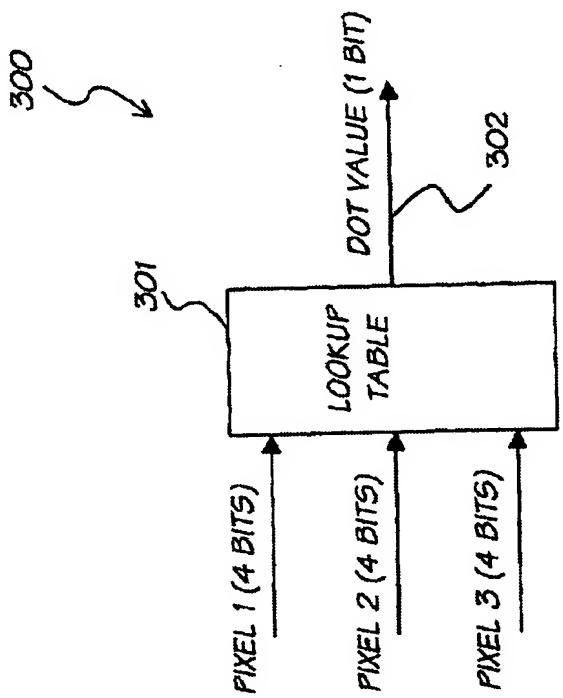


FIG. 43

U.S. Patent

Dec. 25, 2007

Sheet 30 of 149

7,312,845 B2

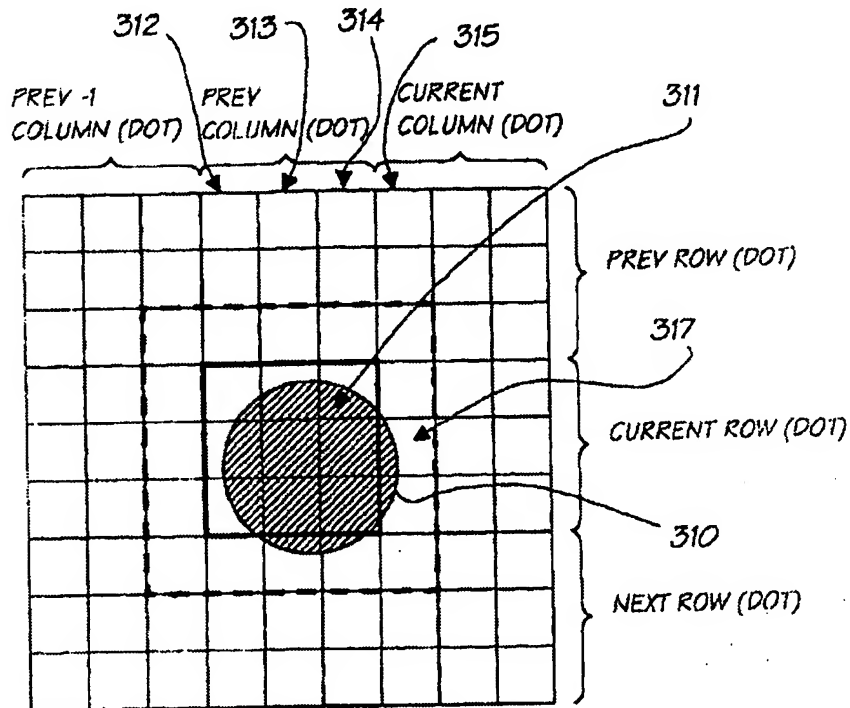


FIG. 44

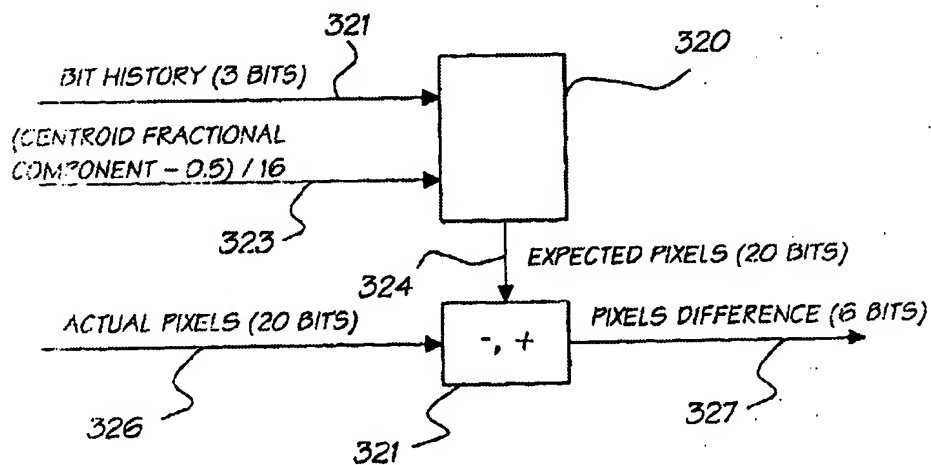


FIG. 45

U.S. Patent

Dec. 25, 2007

Sheet 31 of 149

7,312,845 B2

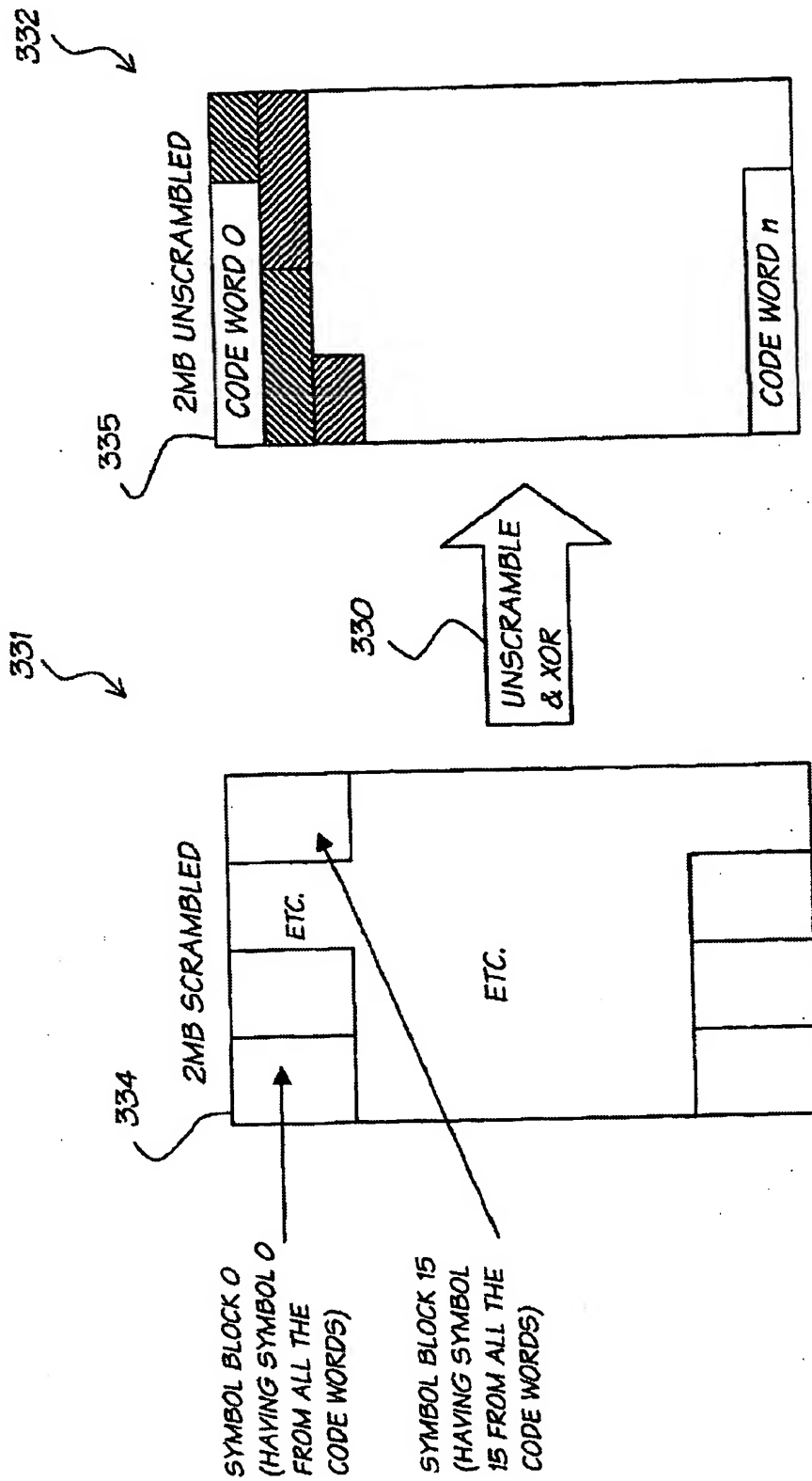


FIG. 46

U.S. Patent

Dec. 25, 2007

Sheet 32 of 149

7,312,845 B2

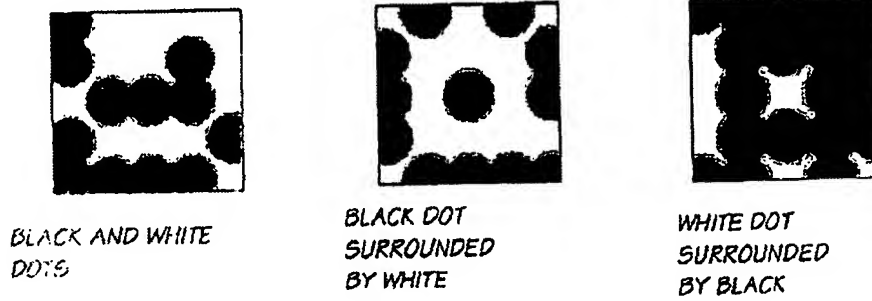


FIG. 47

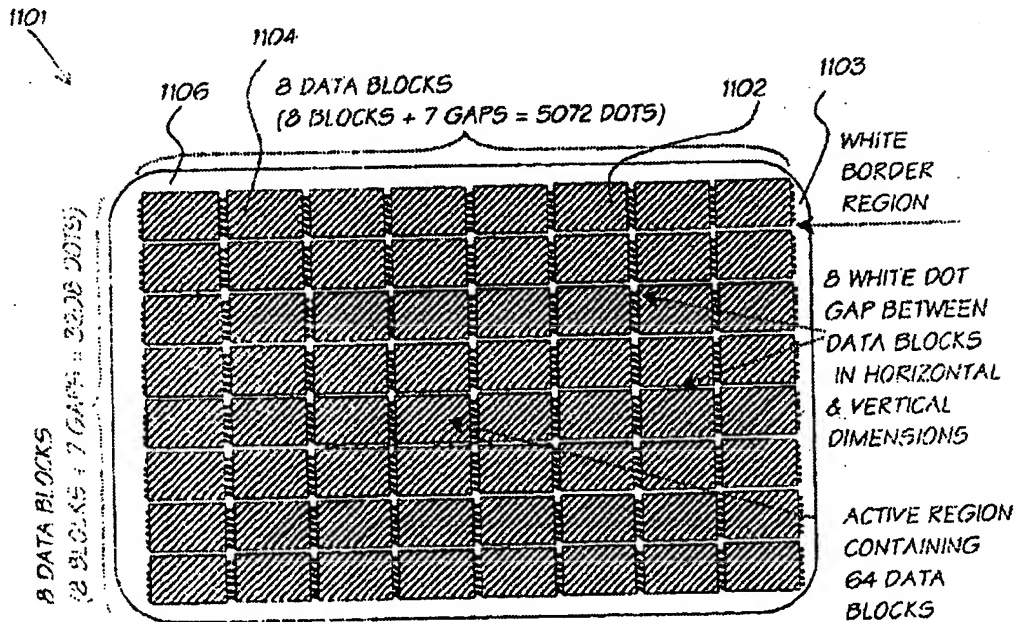


FIG. 48

U.S. Patent

Dec. 25, 2007

Sheet 33 of 149

7,312,845 B2

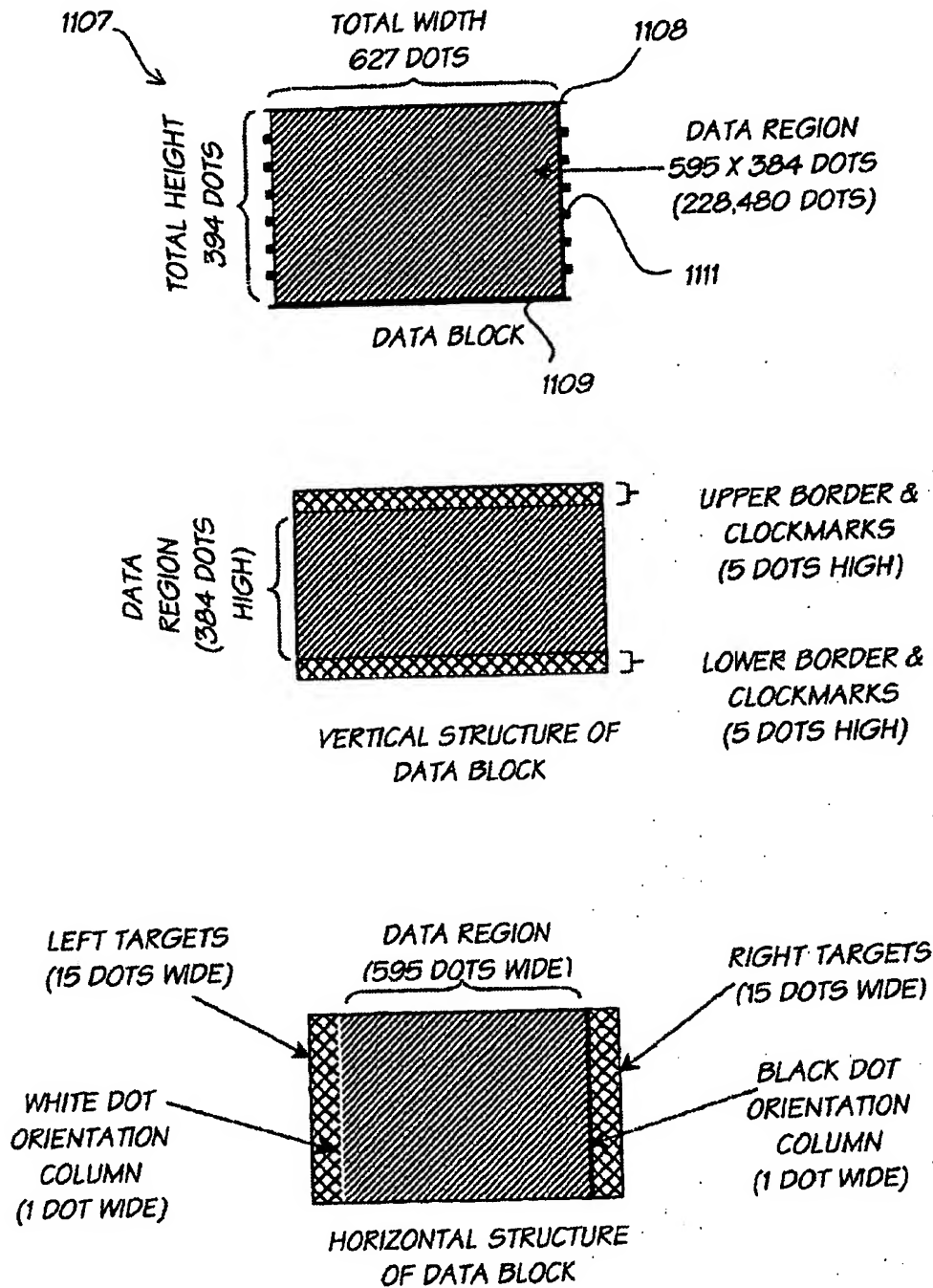


FIG. 49

U.S. Patent

Dec. 25, 2007

Sheet 34 of 149

7,312,845 B2

FIG. 51

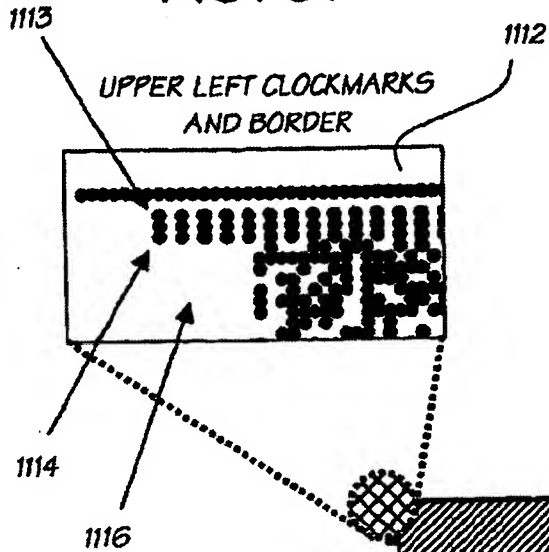


FIG. 52

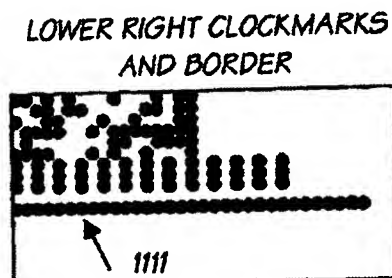


FIG. 50

U.S. Patent

Dec. 25, 2007

Sheet 35 of 149

7,312,845 B2

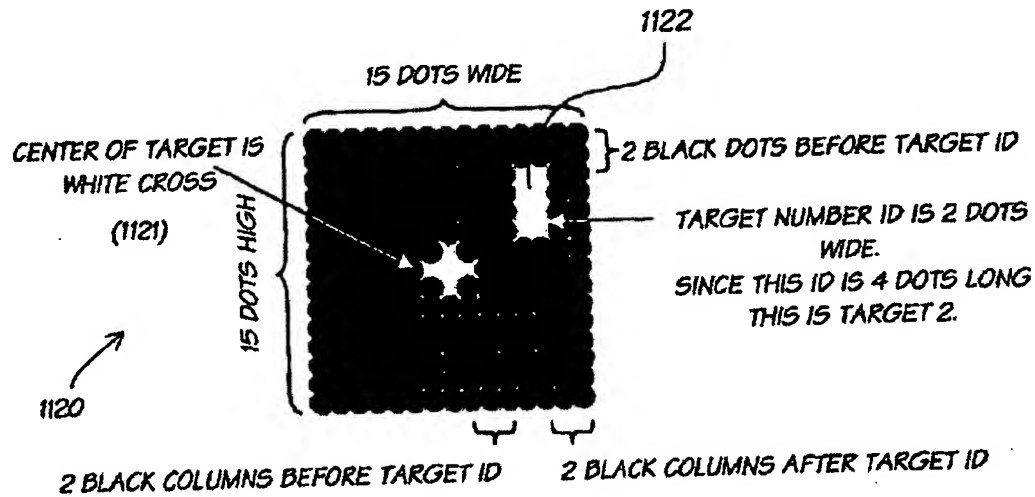


FIG. 53

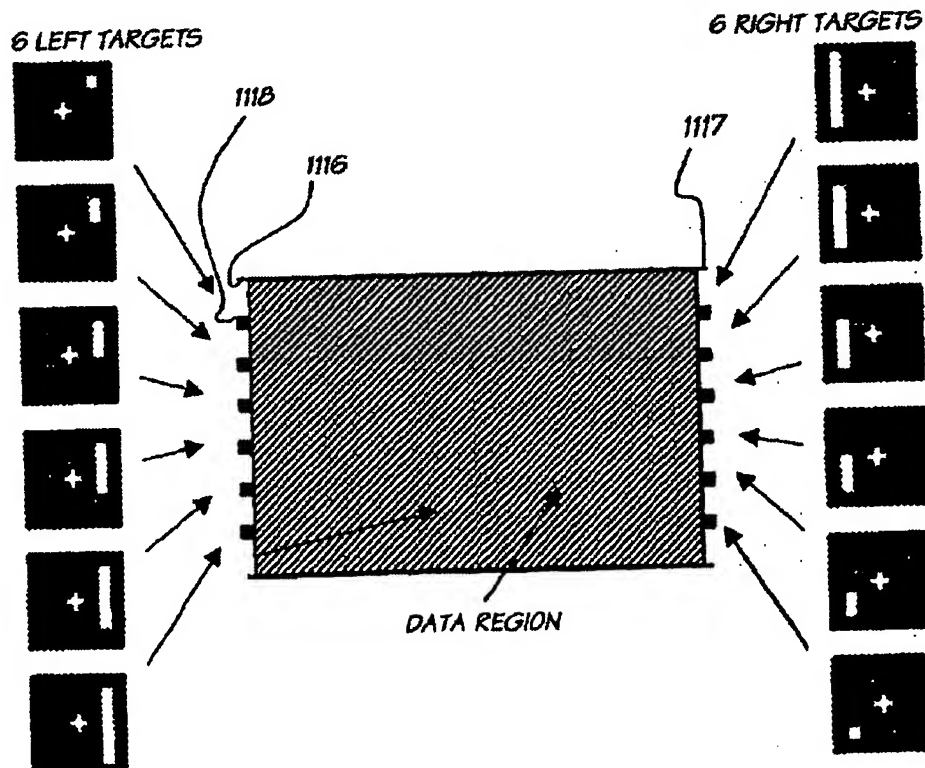


FIG. 54

U.S. Patent

Dec. 25, 2007

Sheet 36 of 149

7,312,845 B2

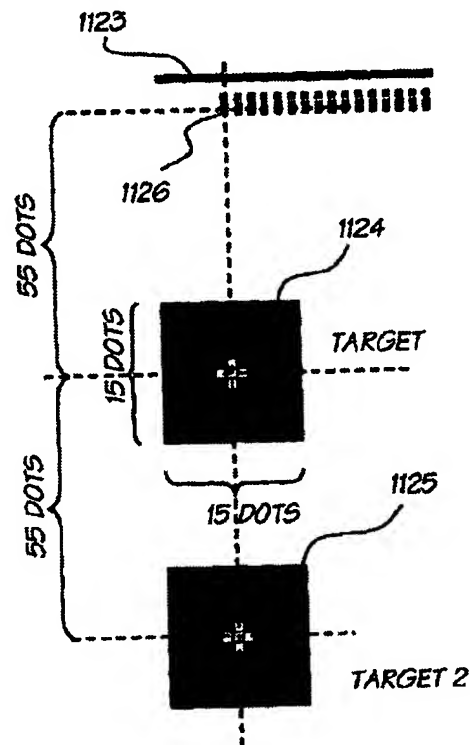


FIG. 55

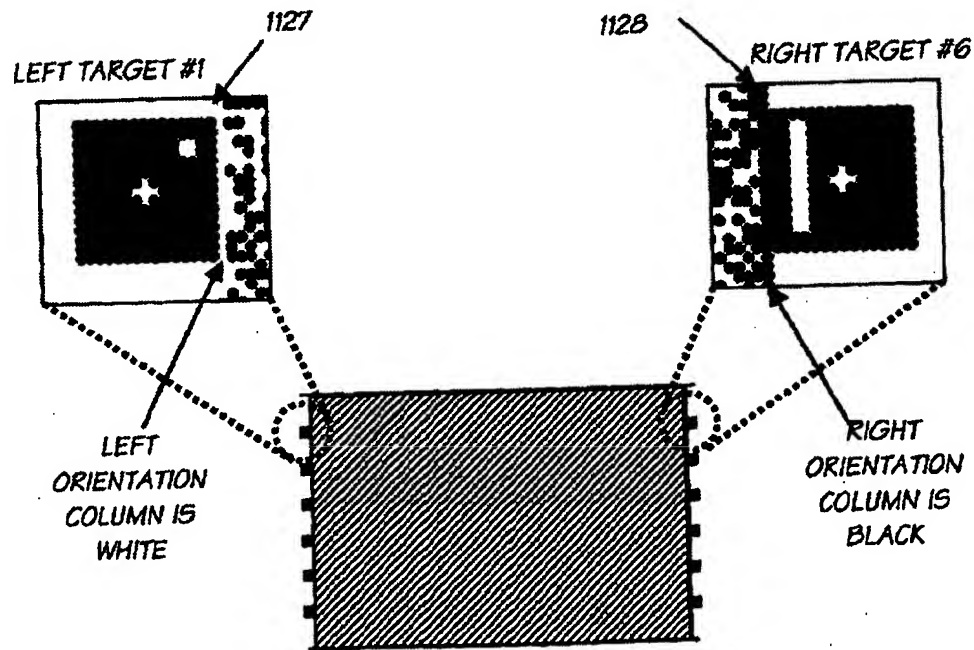


FIG. 56

U.S. Patent

Dec. 25, 2007

Sheet 37 of 149

7,312,845 B2

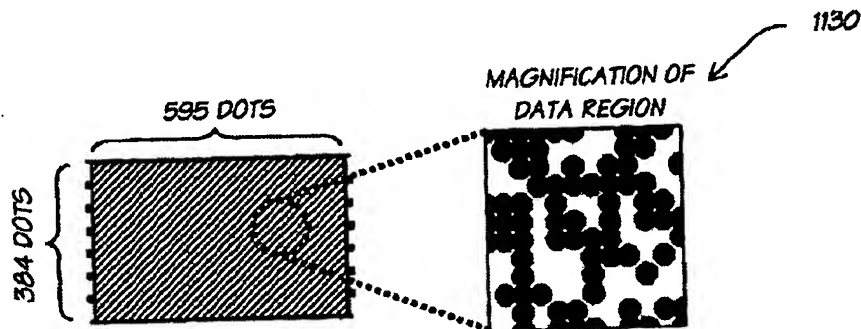


FIG. 57

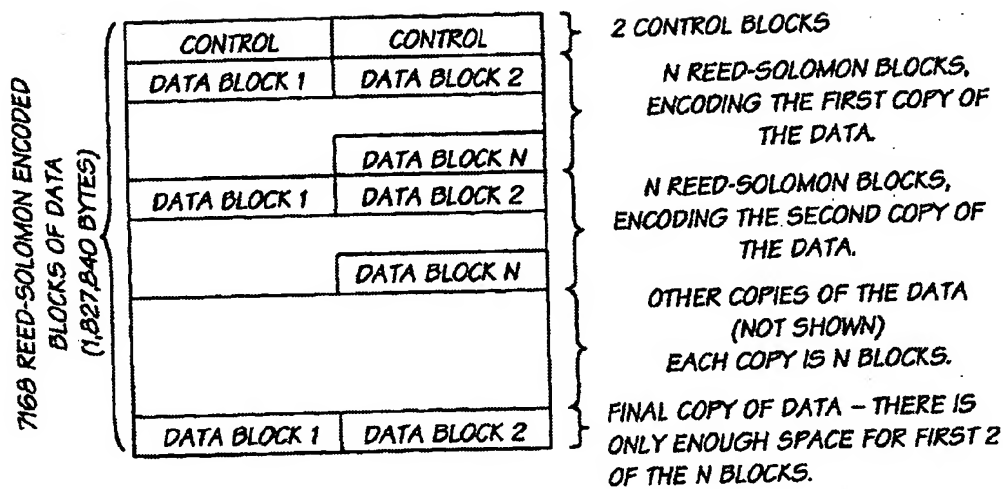


FIG. 58

00:	4F 00 3D 4F 00 3D 4F 00 3D 4F 00 3D	} 32 COPIES OF THE 3 BYTE CONTROL INFORMATION
0C:	4F 00 3D 4F 00 3D 4F 00 3D 4F 00 3D	
18:	4F 00 3D 4F 00 3D 4F 00 3D 4F 00 3D	
24:	4F 00 3D 4F 00 3D 4F 00 3D 4F 00 3D	
30:	4F 00 3D 4F 00 3D 4F 00 3D 4F 00 3D	
3C:	4F 00 3D 4F 00 3D 4F 00 3D 4F 00 3D	
48:	4F 00 3D 4F 00 3D 4F 00 3D 4F 00 3D	
54:	4F 00 3D 4F 00 3D 4F 00 3D 4F 00 3D	
60:	00 00 00 00 00 00 00 00 00 00 00 00	} RESERVED BYTES ARE 0
6C:	00 00 00 00 00 00 00 00 00 00 00 00	
78:	00 00 00 00 00 00 00 00 00 00 00 00	

FIG. 59

U.S. Patent

Dec. 25, 2007

Sheet 38 of 149

7,312,845 B2

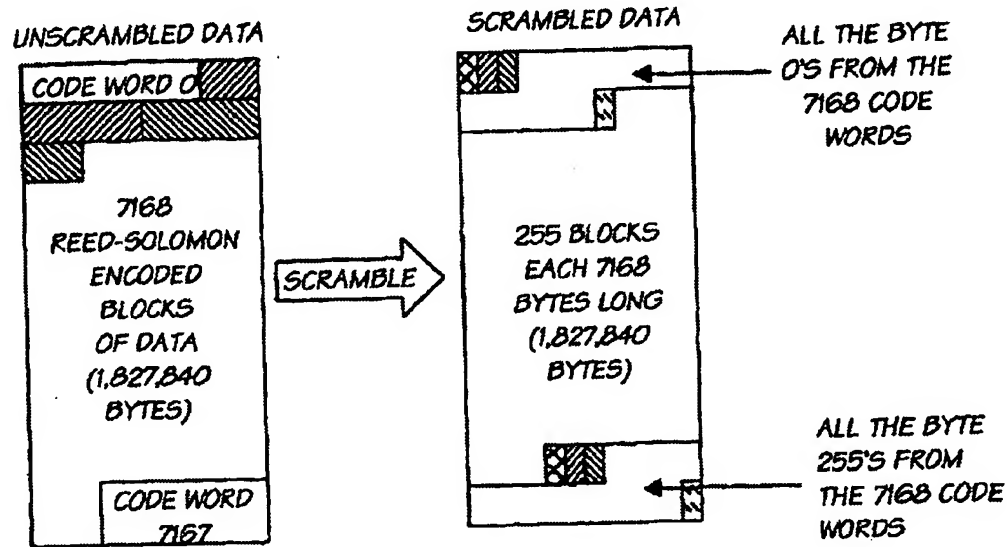


FIG. 60

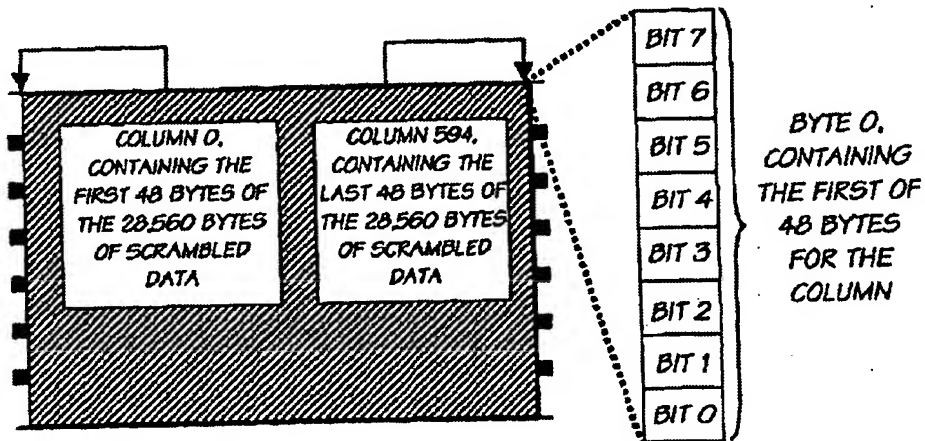


FIG. 61

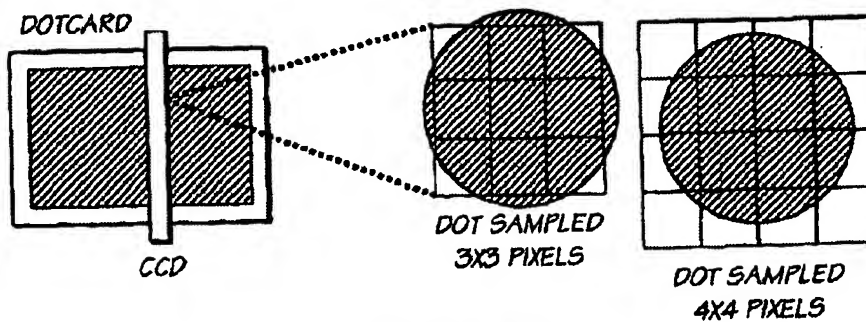


FIG. 62

U.S. Patent

Dec. 25, 2007

Sheet 39 of 149

7,312,845 B2

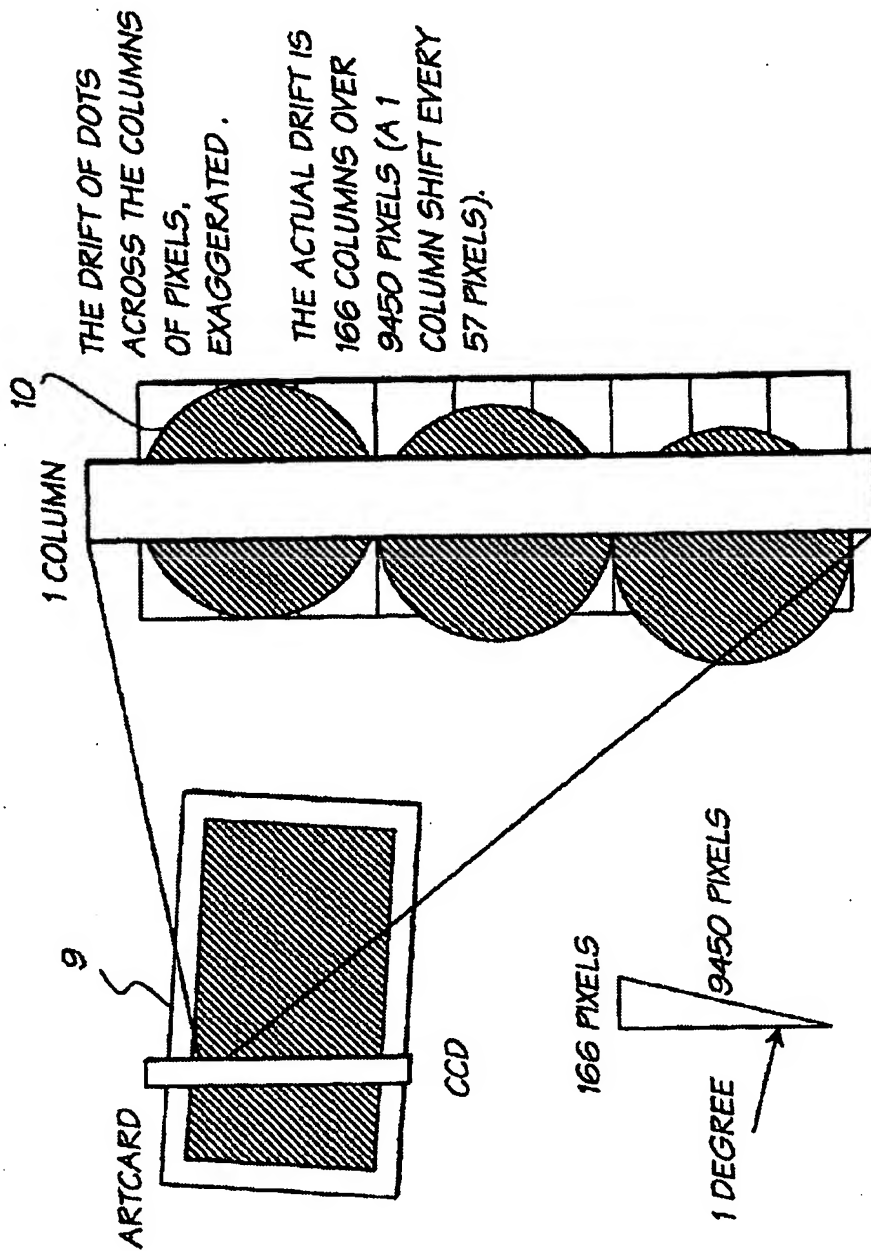


FIG. 63

U.S. Patent

Dec. 25, 2007

Sheet 40 of 149

7,312,845 B2

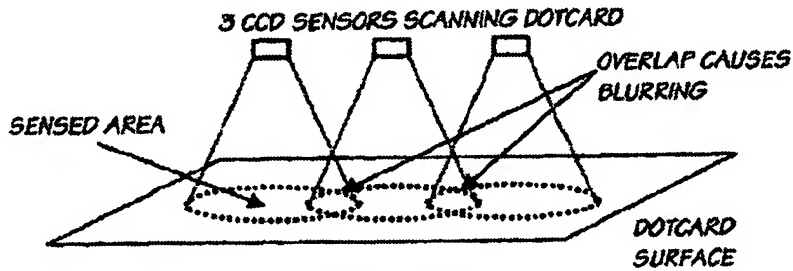


FIG. 64

RANGE OF BLACK DOTS
(FREQUENCY DISTRIBUTION)

RANGE OF WHITE DOTS
(FREQUENCY DISTRIBUTION)

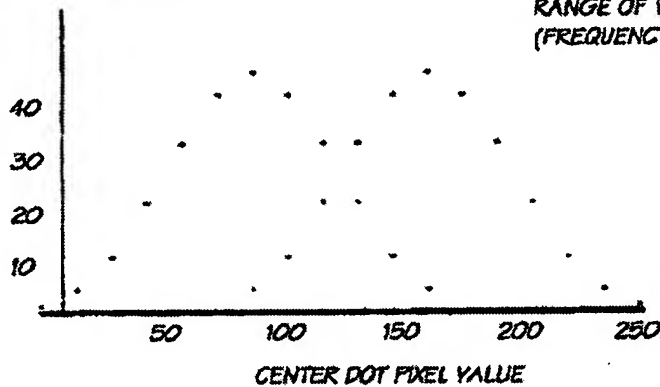


FIG. 65

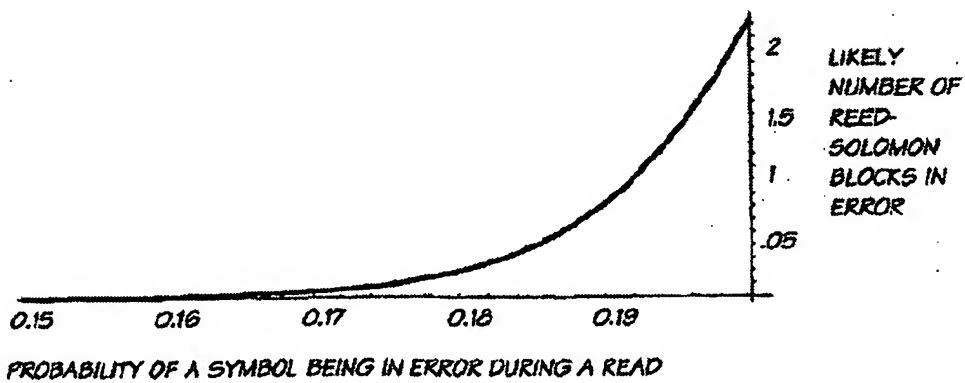


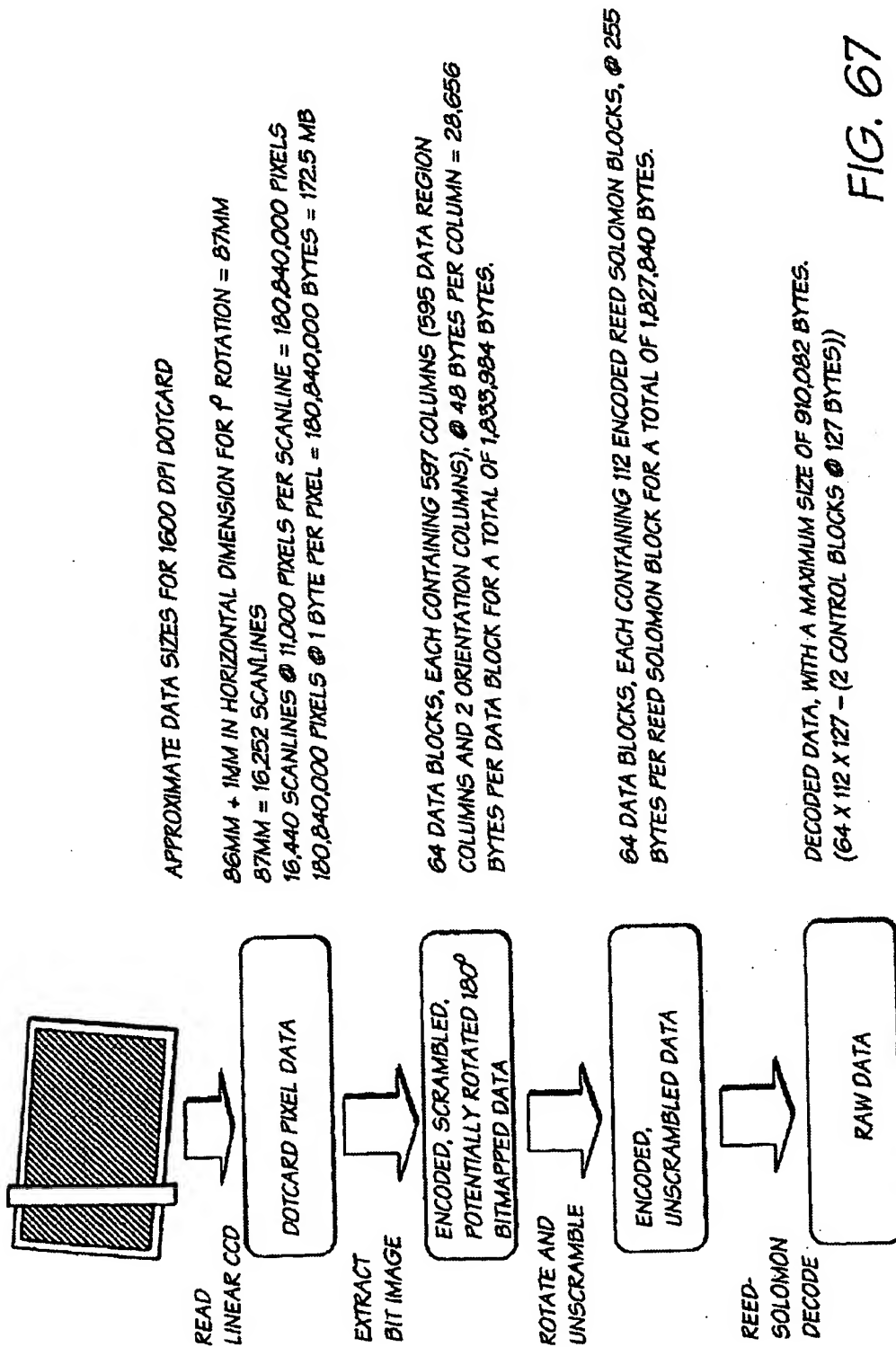
FIG. 66

U.S. Patent

Dec. 25, 2007

Sheet 41 of 149

7,312,845 B2



U.S. Patent

Dec. 25, 2007

Sheet 42 of 149

7,312,845 B2

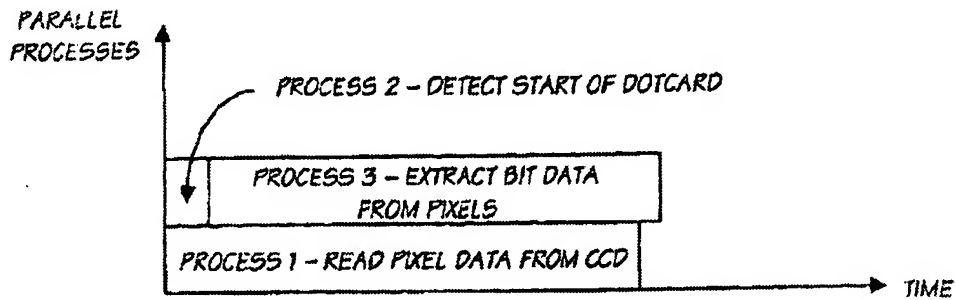


FIG. 68

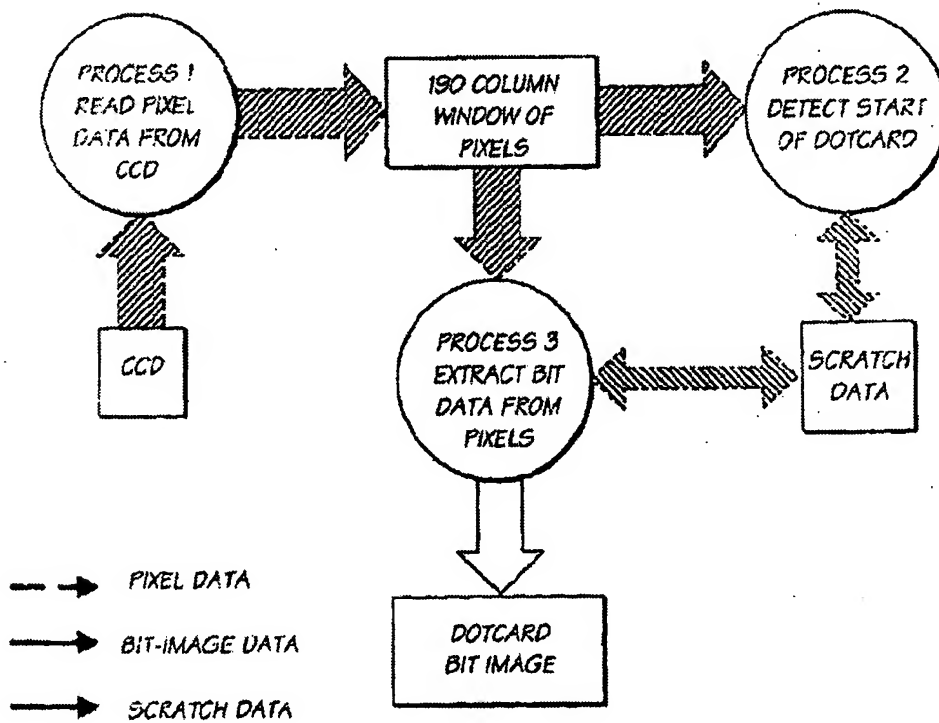


FIG. 69

U.S. Patent

Dec. 25, 2007

Sheet 43 of 149

7,312,845 B2

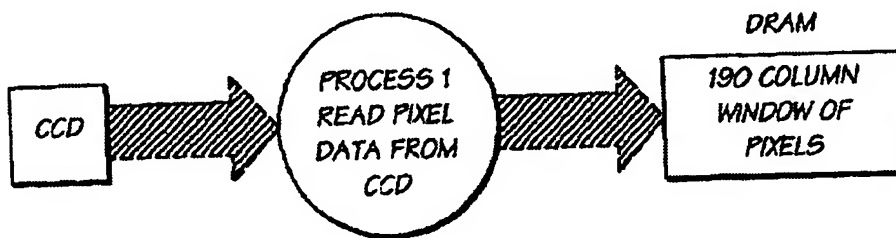


FIG. 70

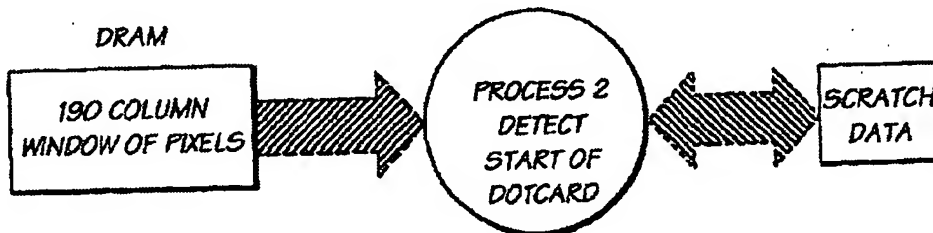


FIG. 71

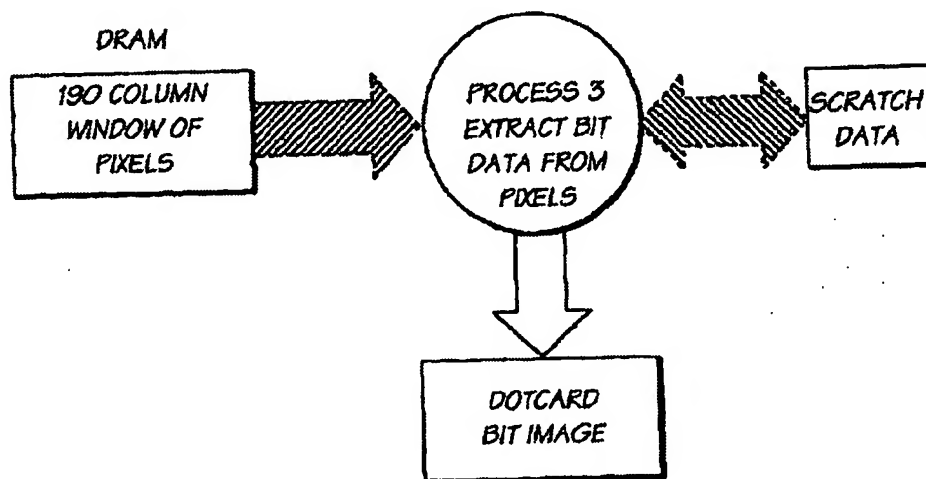


FIG. 72

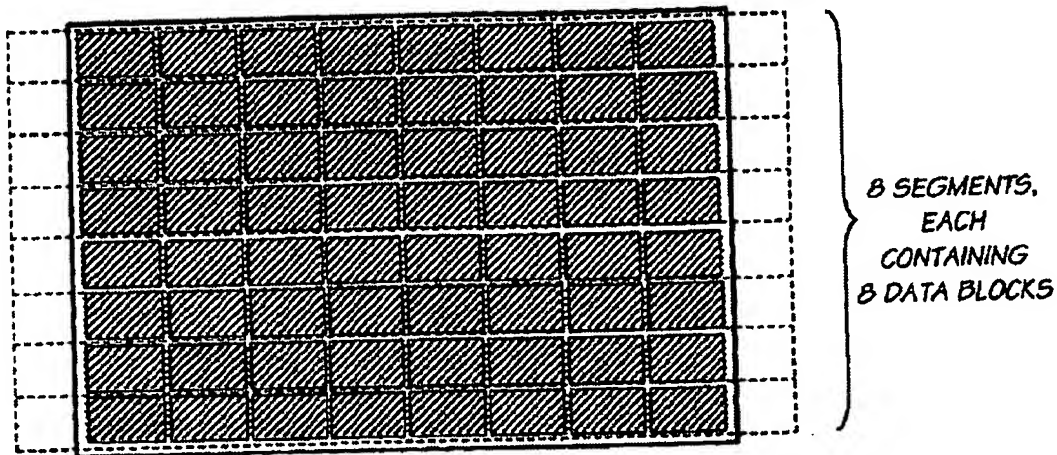


FIG. 73

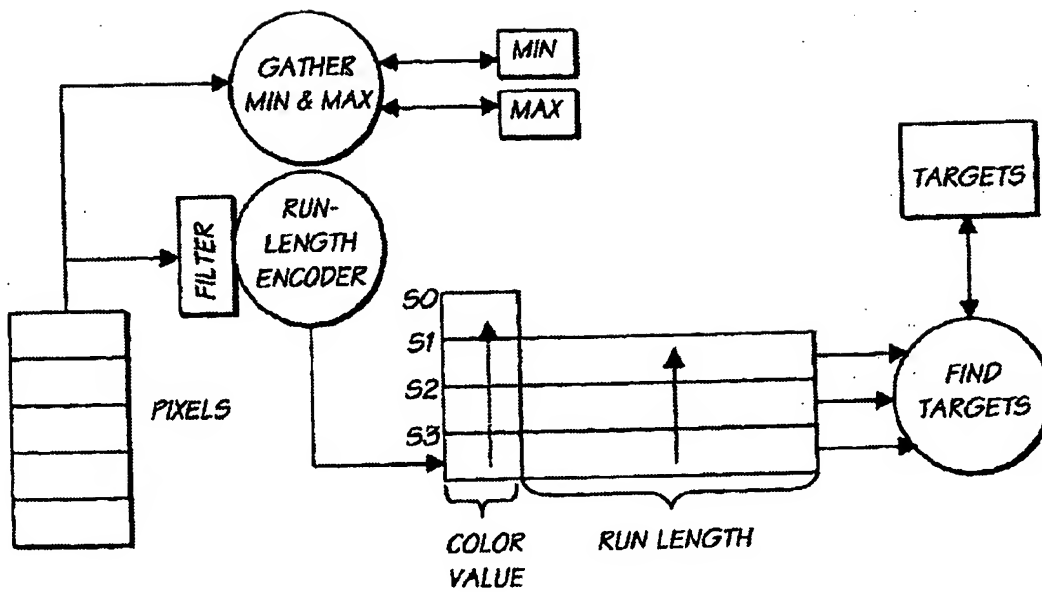


FIG. 74

U.S. Patent

Dec. 25, 2007

Sheet 45 of 149

7,312,845 B2

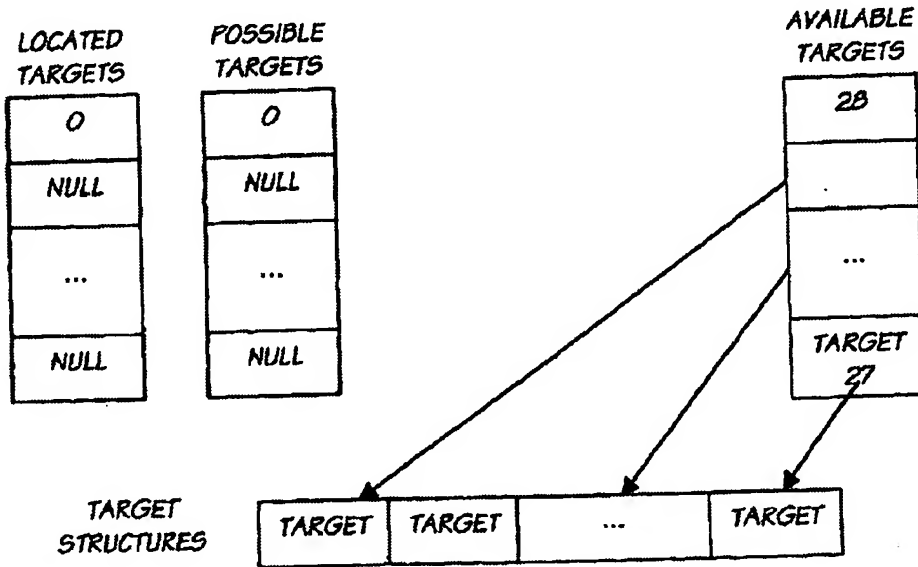


FIG. 75

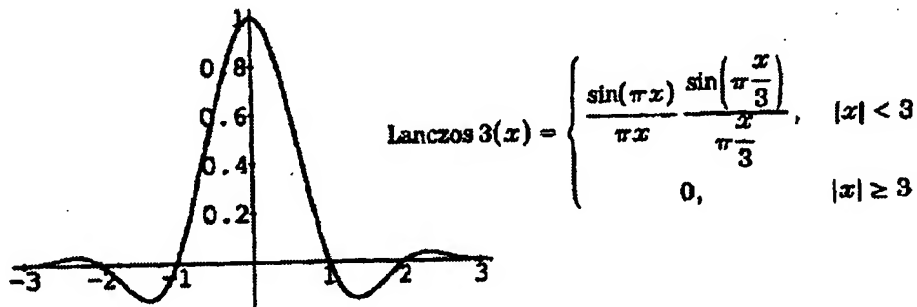


FIG. 76

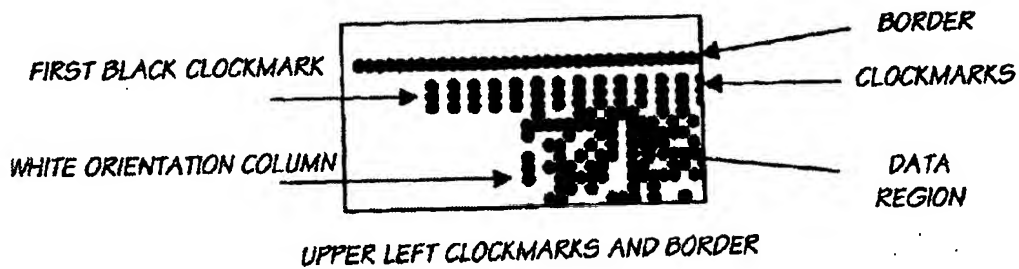


FIG. 77

U.S. Patent

Dec. 25, 2007

Sheet 46 of 149

7,312,845 B2

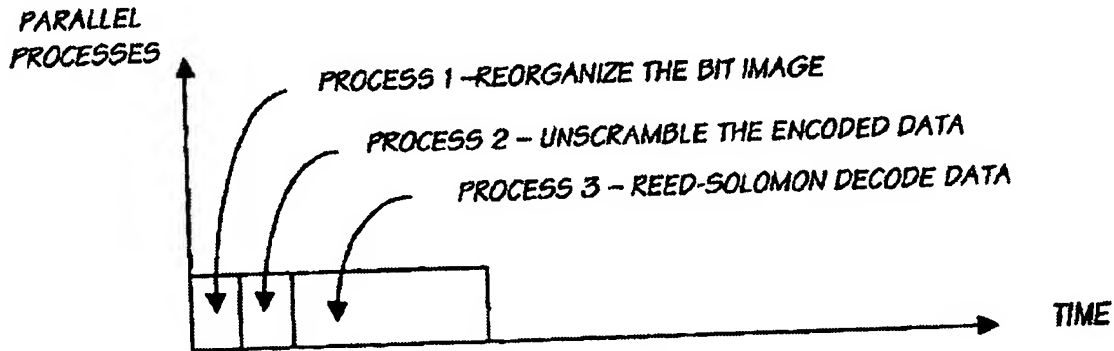


FIG. 78

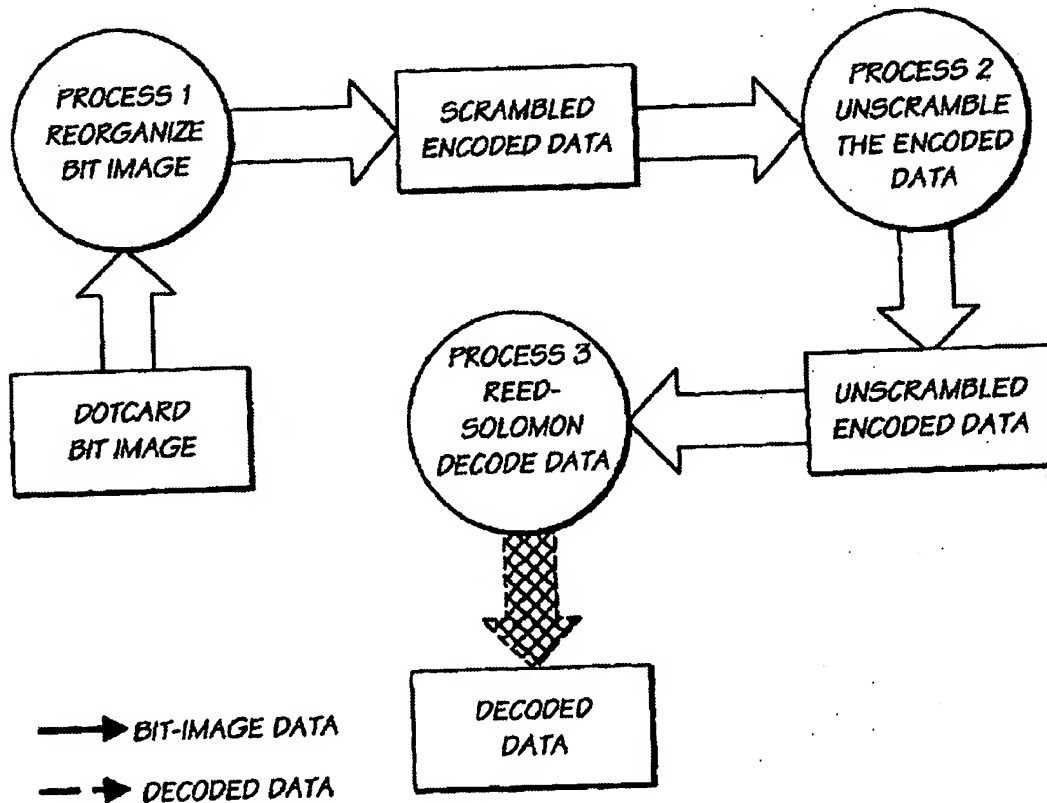


FIG. 79

U.S. Patent

Dec. 25, 2007

Sheet 47 of 149

7,312,845 B2

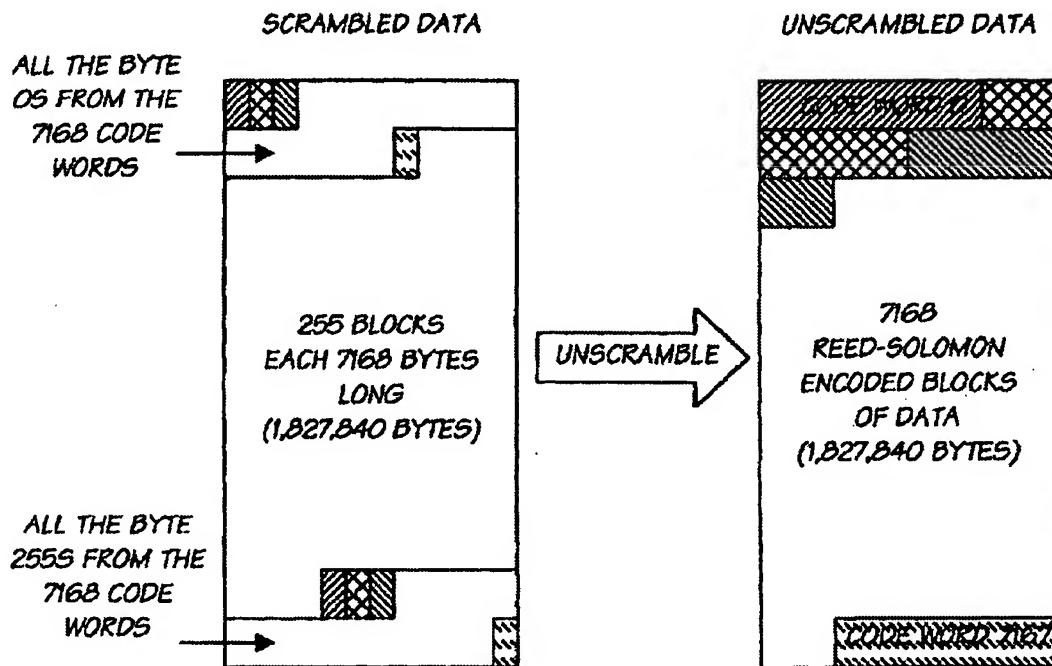


FIG. 80

U.S. Patent

Dec. 25, 2007

Sheet 48 of 149

7,312,845 B2

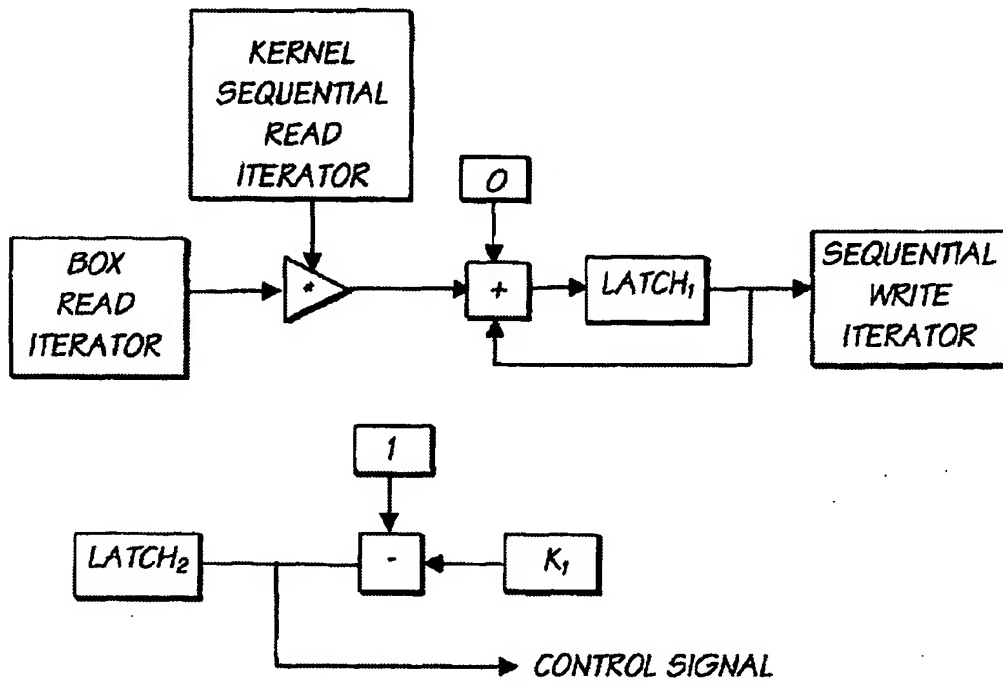


FIG. 81

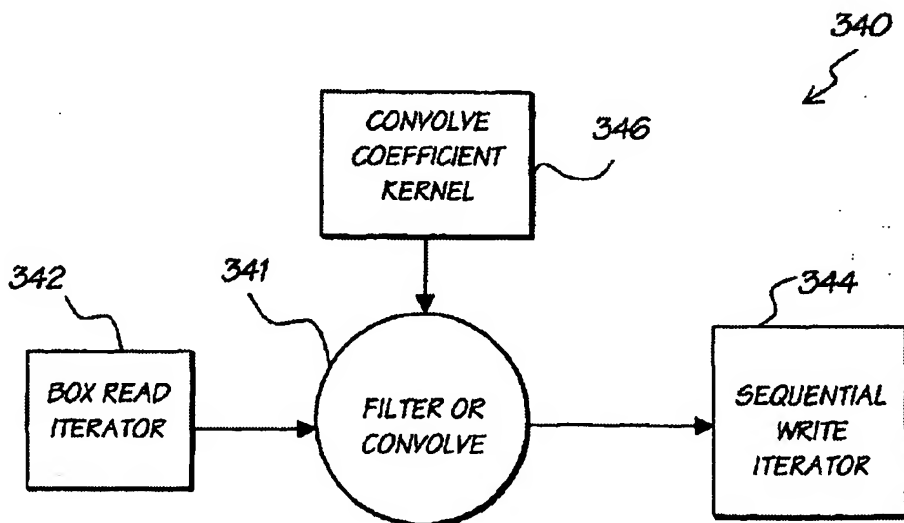


FIG. 82

U.S. Patent

Dec. 25, 2007

Sheet 49 of 149

7,312,845 B2

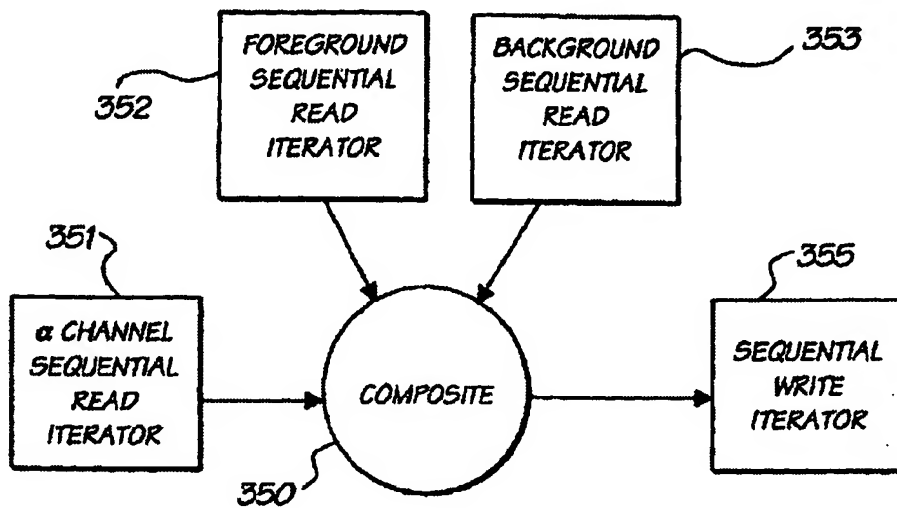


FIG. 83

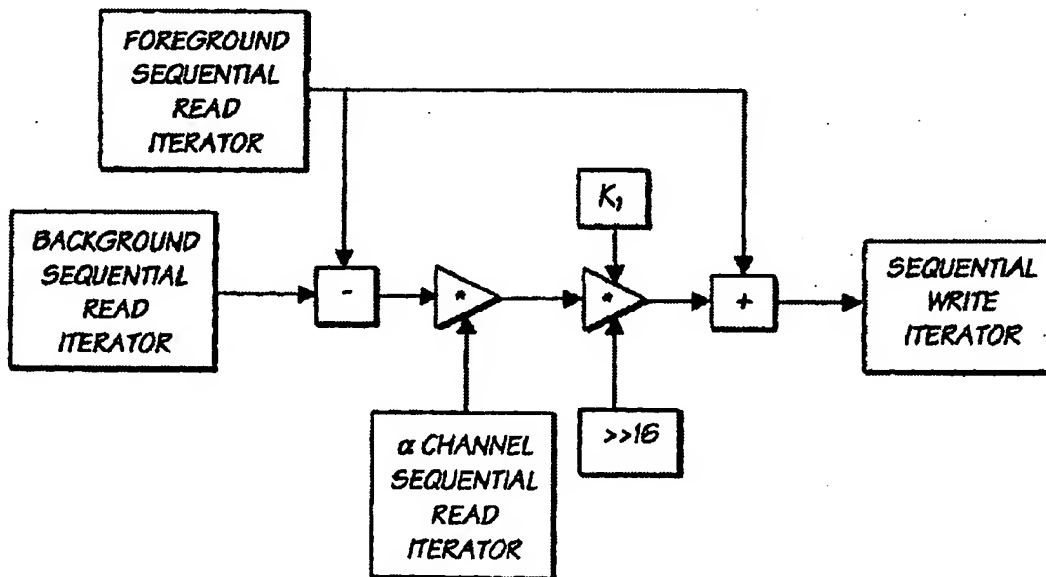


FIG. 84

U.S. Patent

Dec. 25, 2007

Sheet 50 of 149

7,312,845 B2

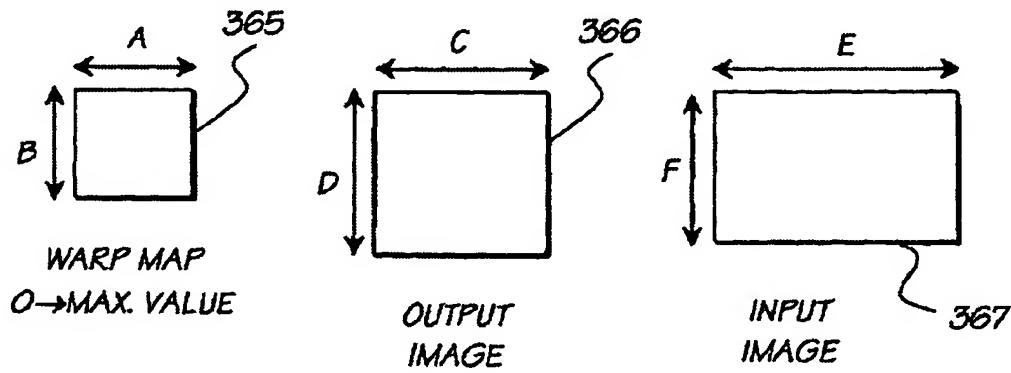


FIG. 85

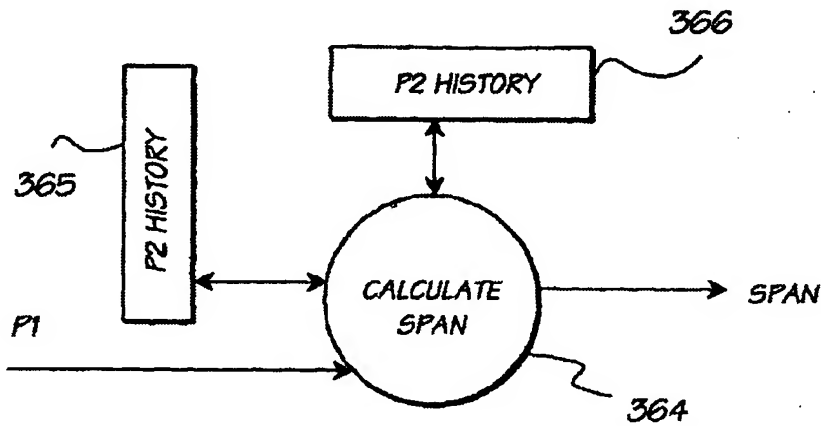


FIG. 86

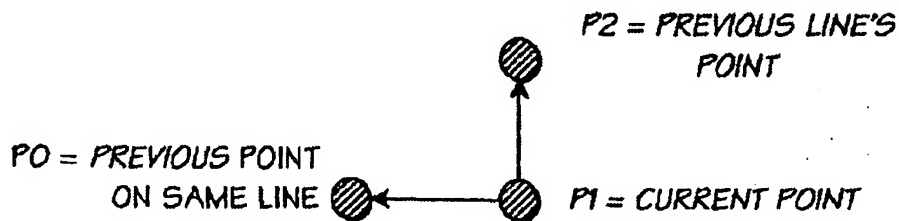


FIG. 88

U.S. Patent

Dec. 25, 2007

Sheet 51 of 149

7,312,845 B2

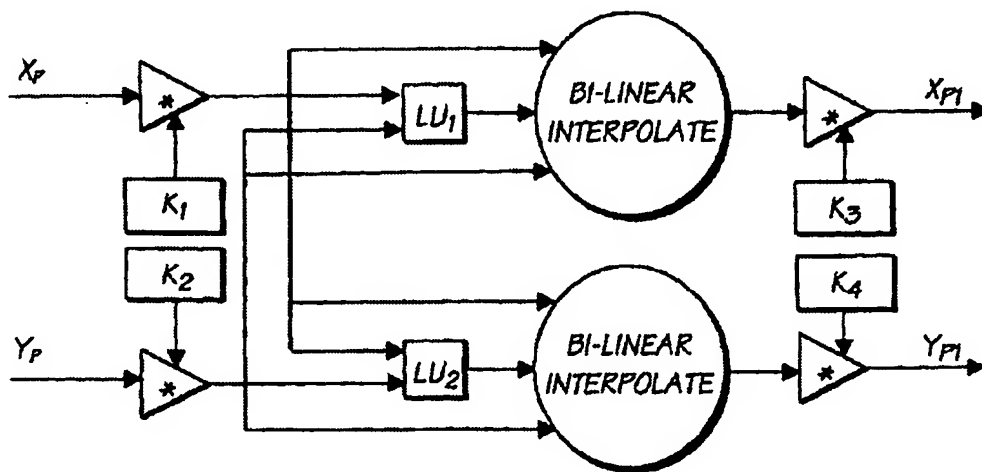


FIG. 87

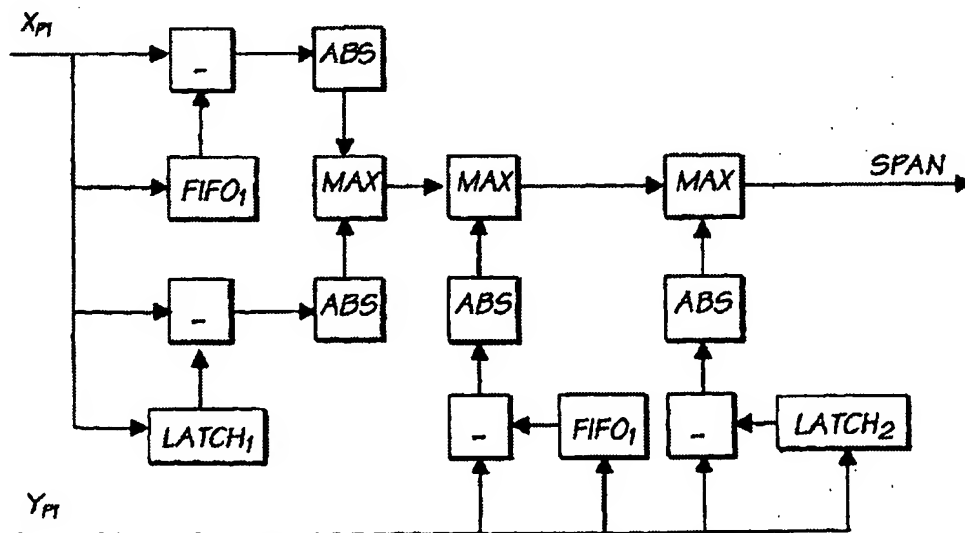


FIG. 89

U.S. Patent

Dec. 25, 2007

Sheet 52 of 149

7,312,845 B2

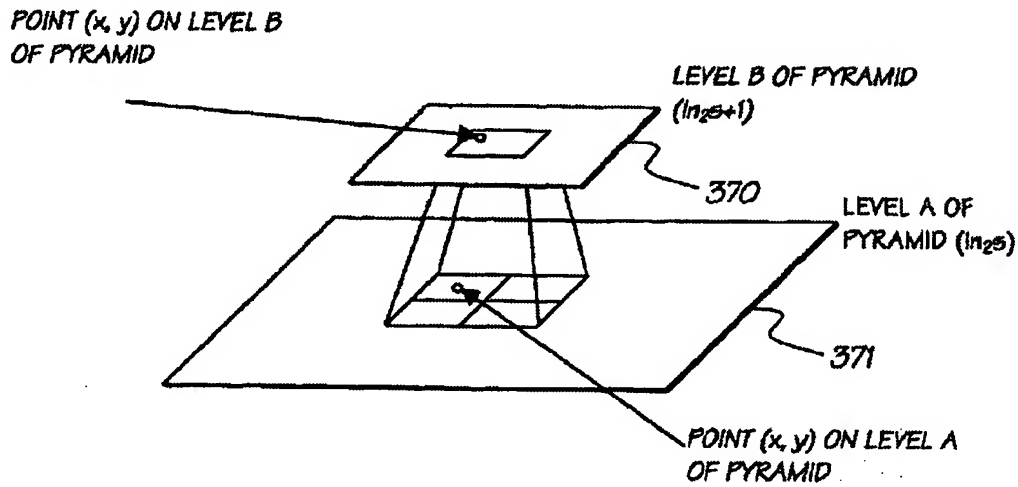


FIG. 90

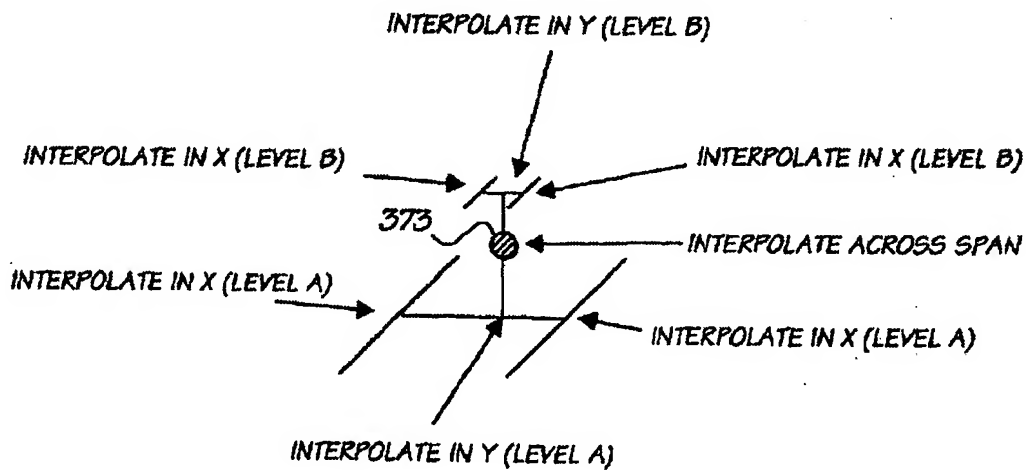


FIG. 91

U.S. Patent

Dec. 25, 2007

Sheet 53 of 149

7,312,845 B2

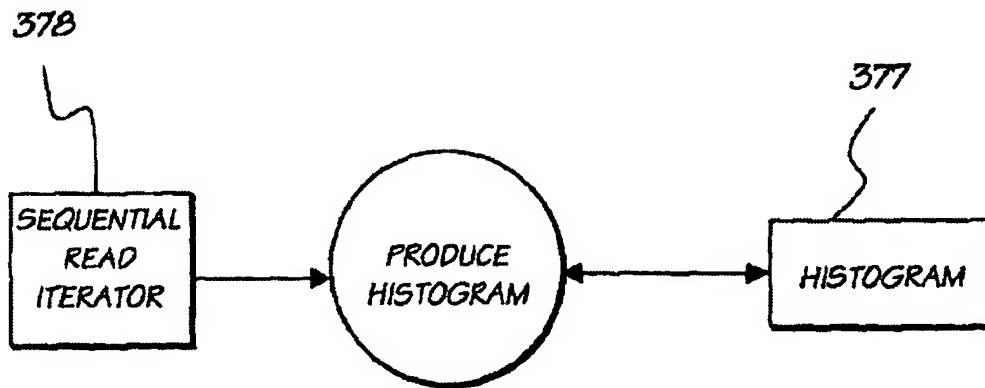


FIG. 92

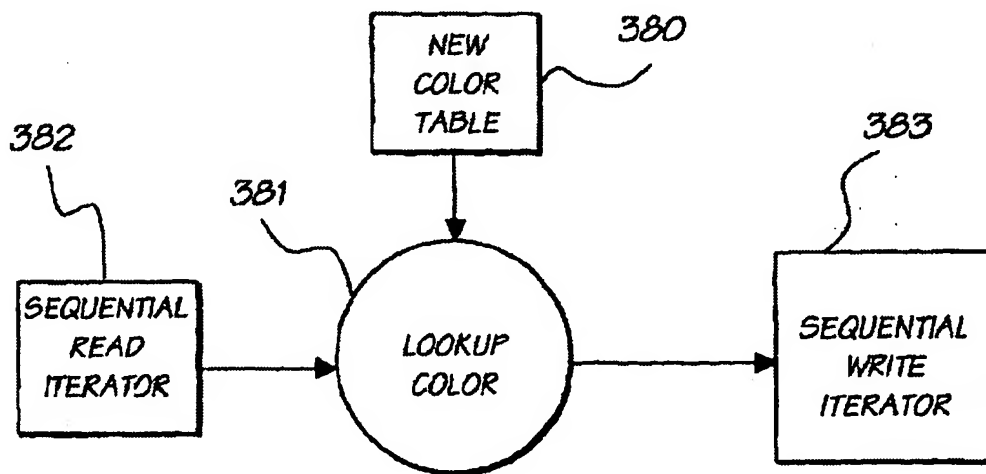


FIG. 93

U.S. Patent

Dec. 25, 2007

Sheet 54 of 149

7,312,845 B2

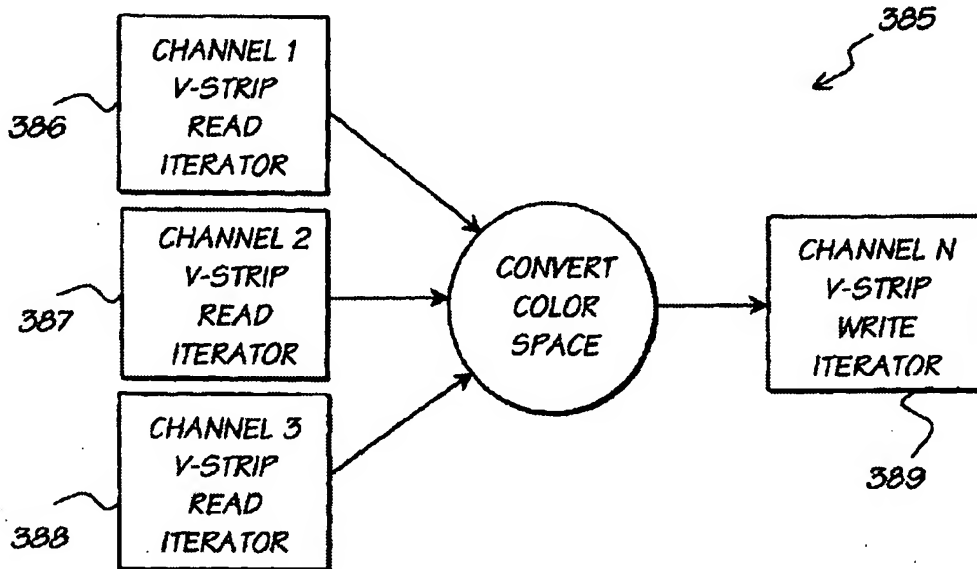


FIG. 94

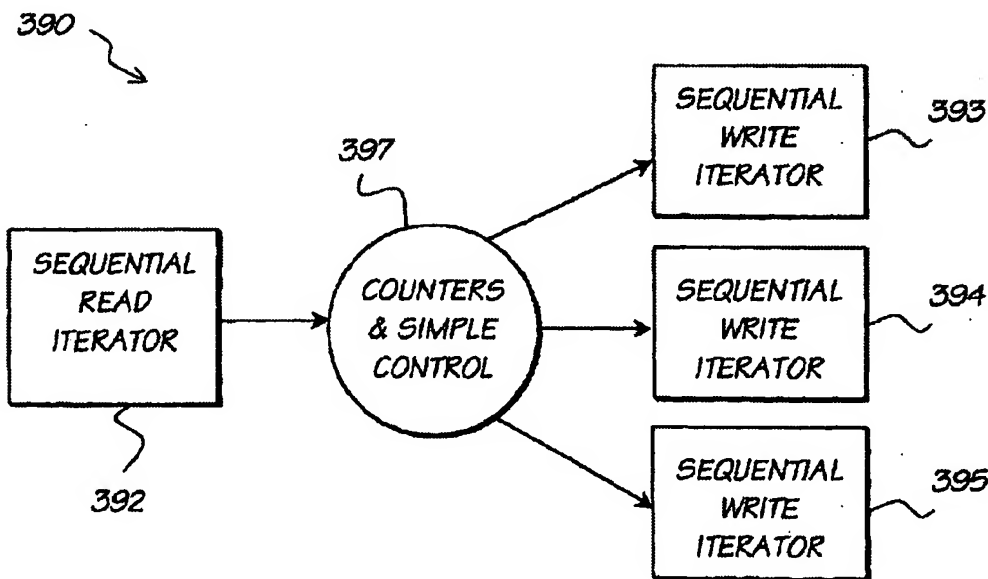


FIG. 101

U.S. Patent

Dec. 25, 2007

Sheet 55 of 149

7,312,845 B2

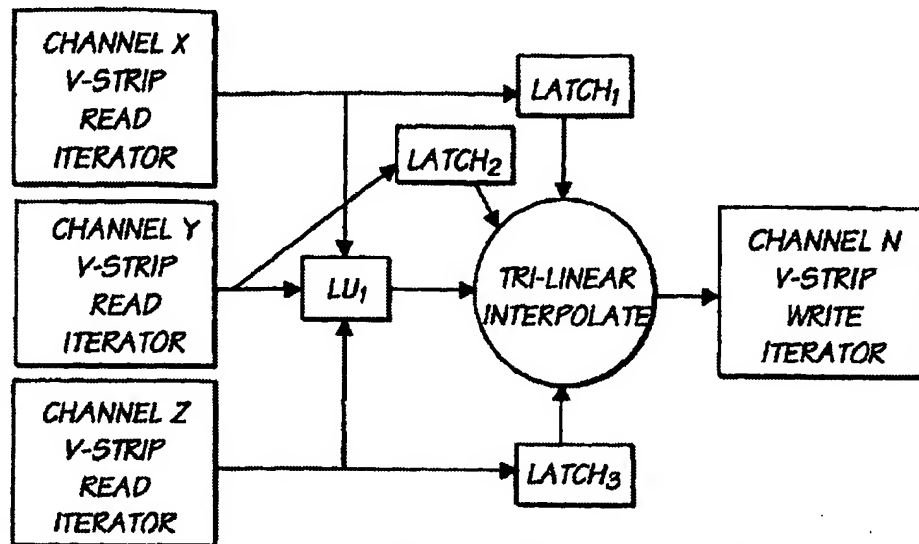


FIG. 95

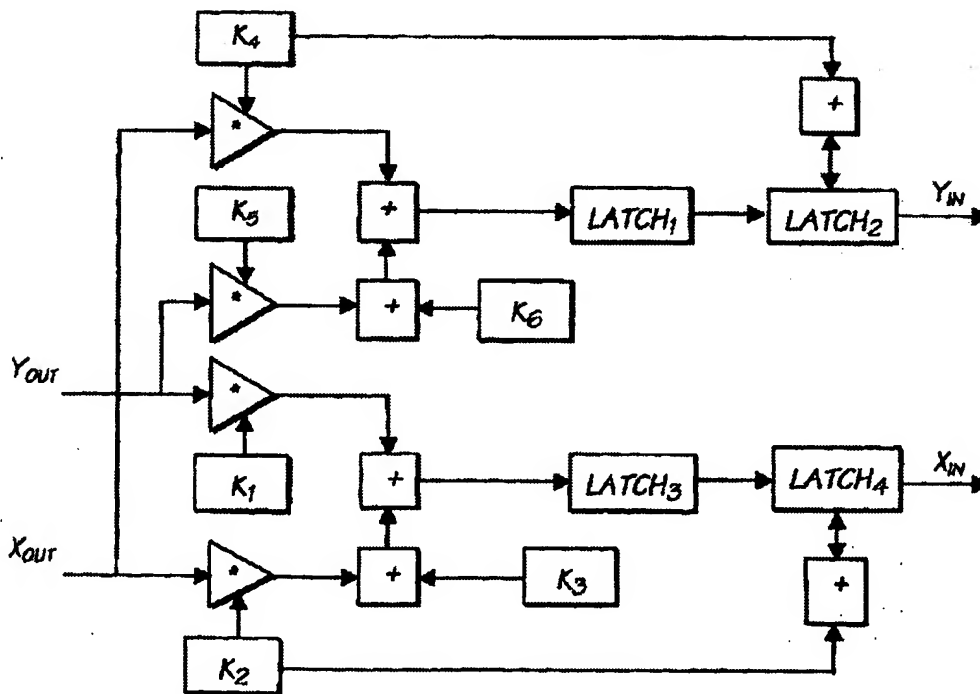


FIG. 96

U.S. Patent

Dec. 25, 2007

Sheet 56 of 149

7,312,845 B2

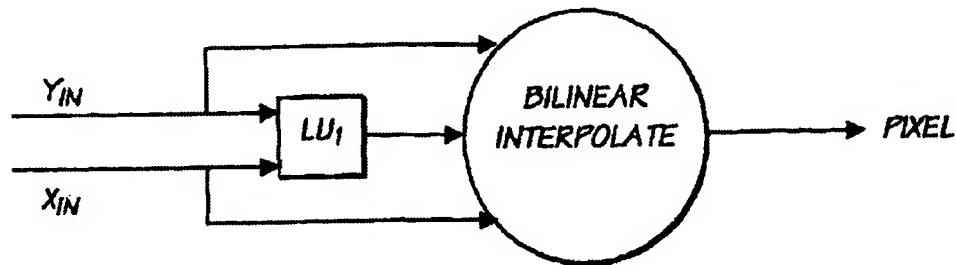


FIG. 97

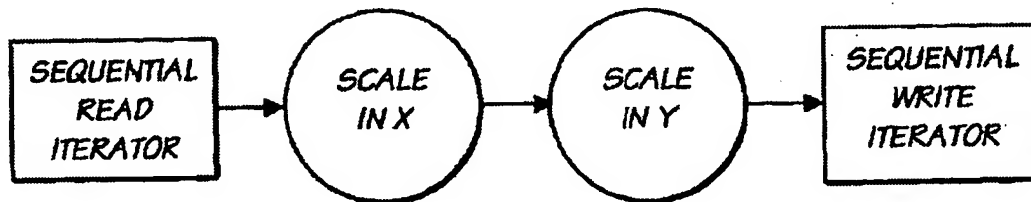


FIG. 98

U.S. Patent

Dec. 25, 2007

Sheet 57 of 149

7,312,845 B2

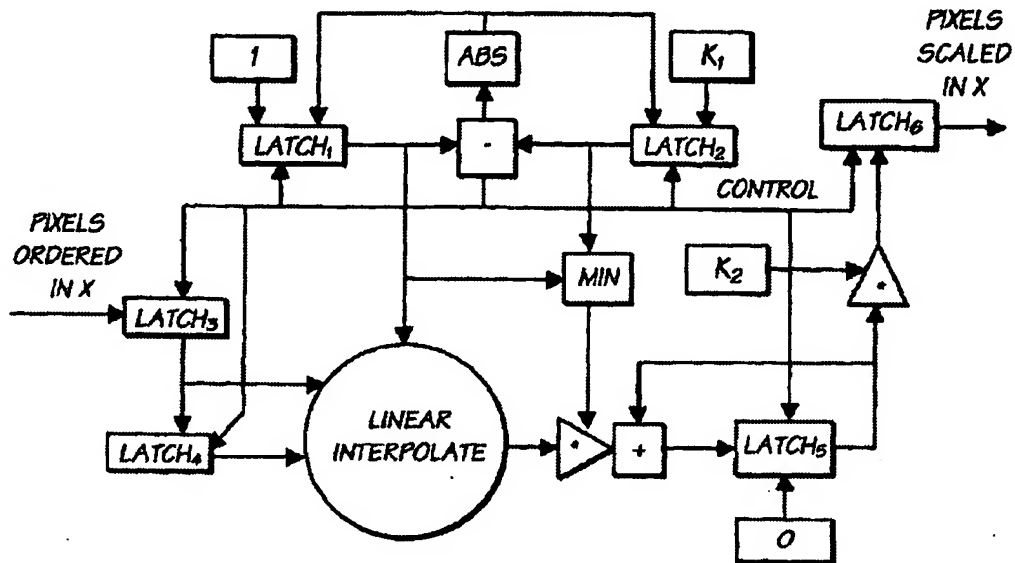


FIG. 99

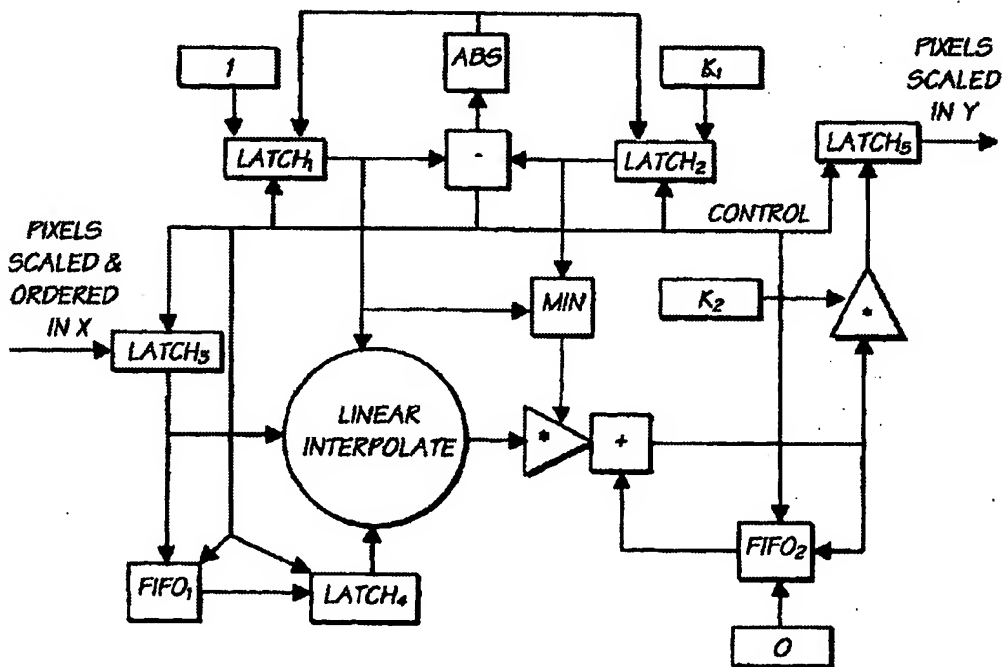
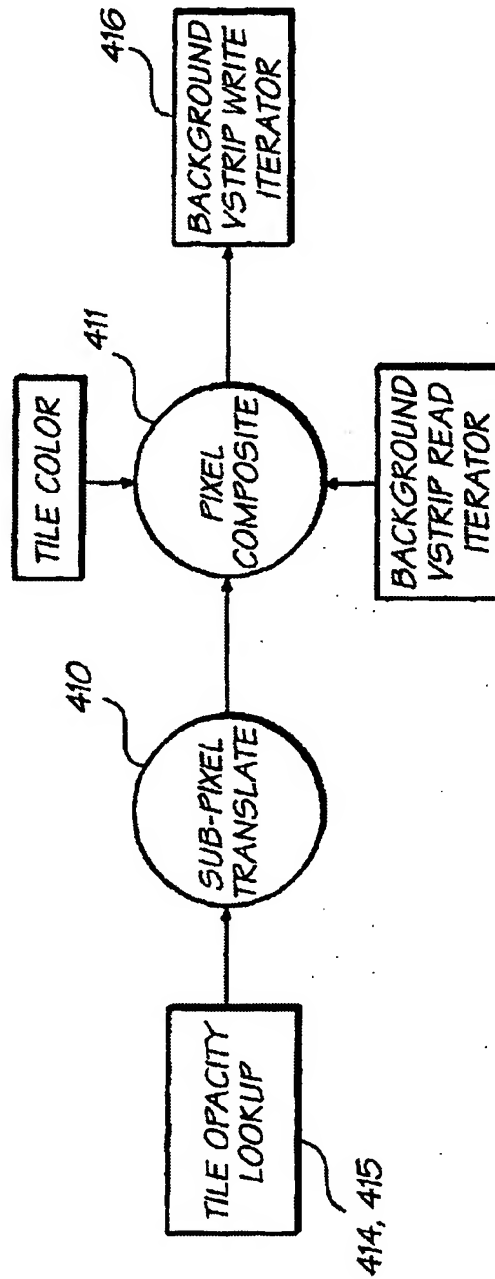
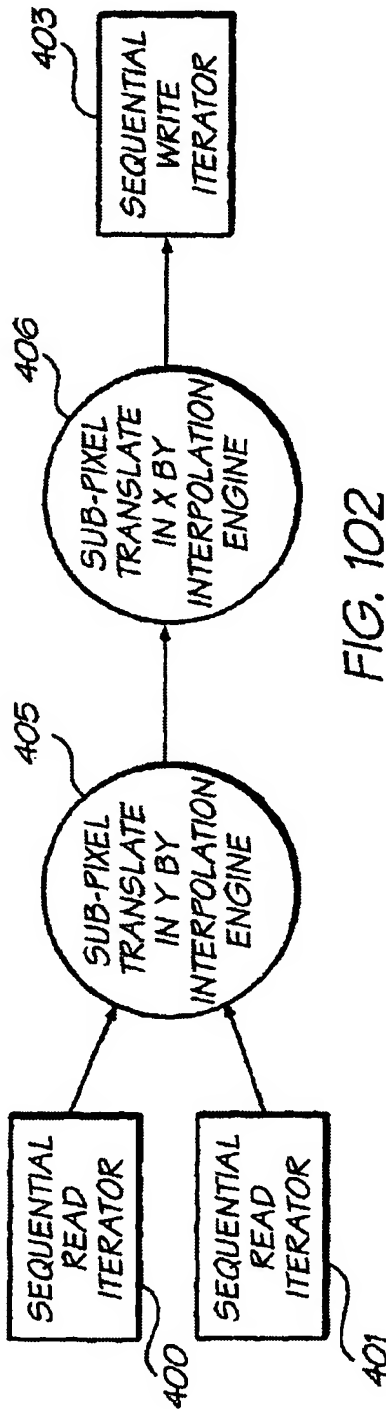
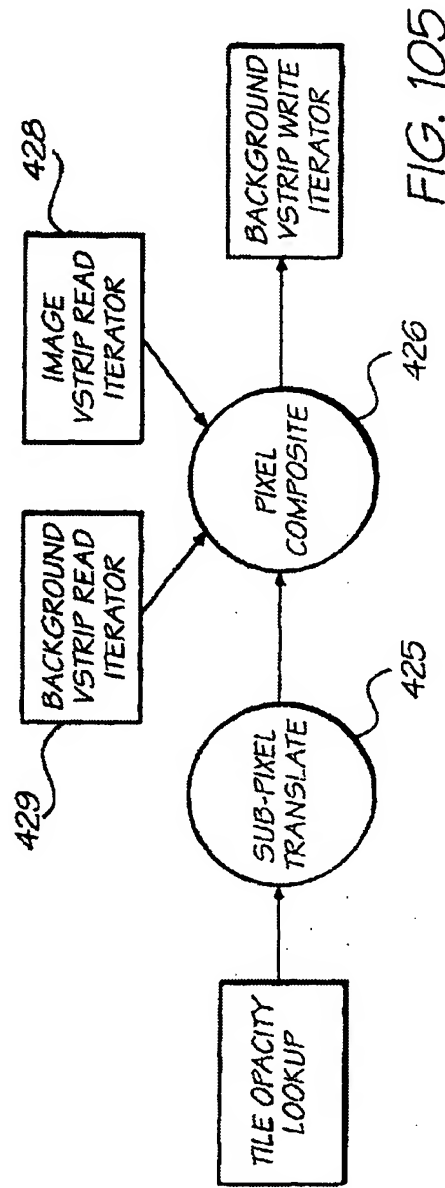
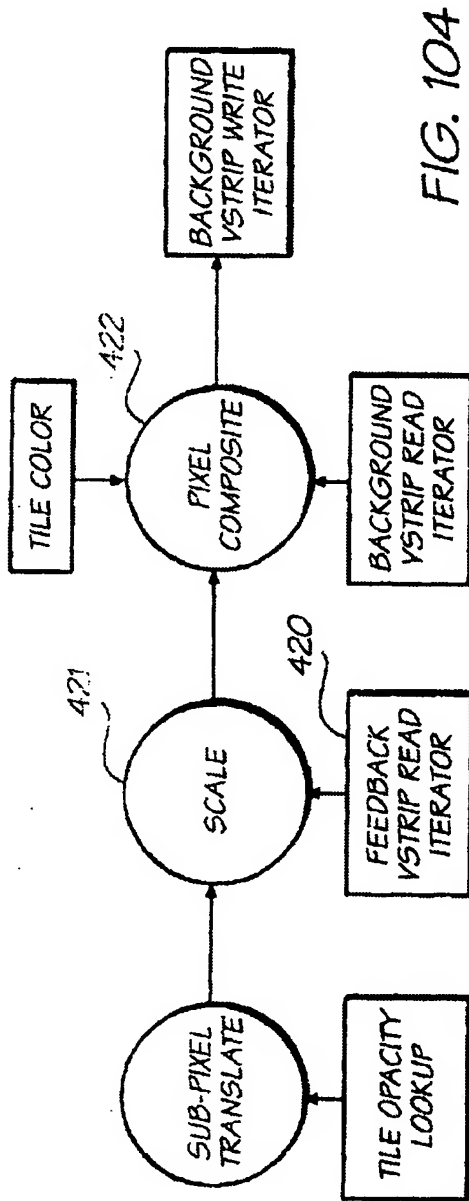


FIG. 100





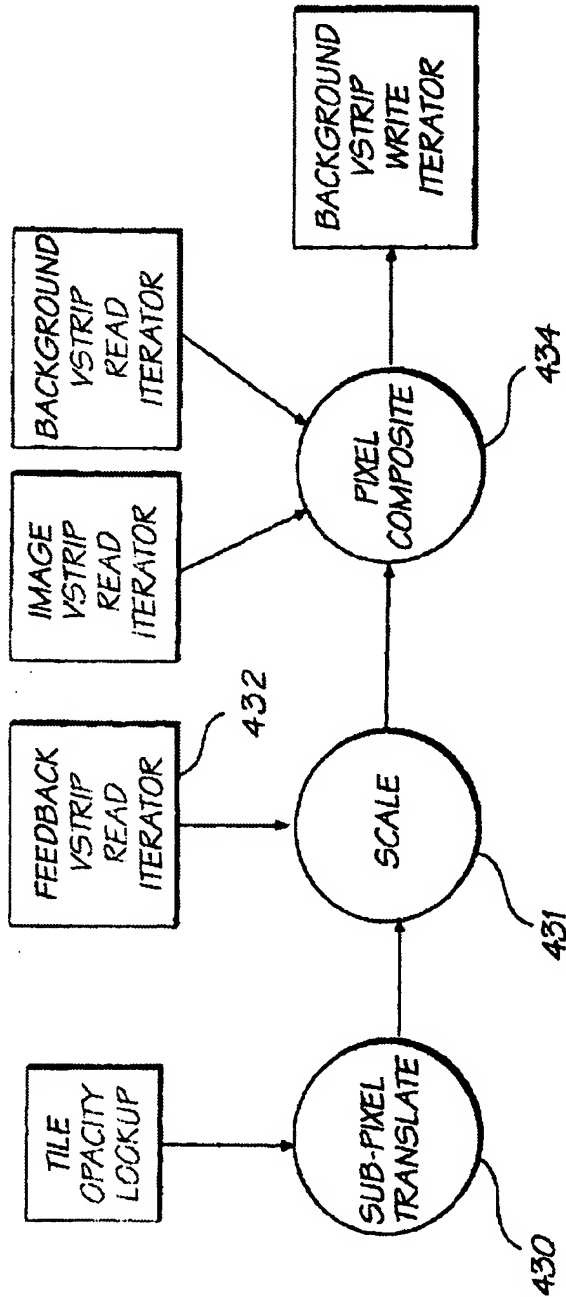


FIG. 106

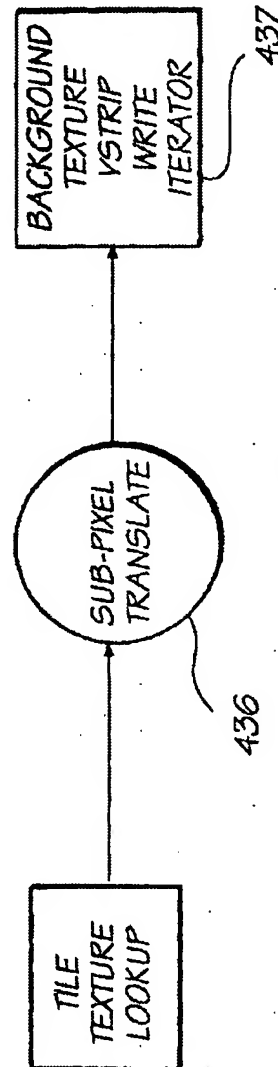


FIG. 107

U.S. Patent

Dec. 25, 2007

Sheet 61 of 149

7,312,845 B2

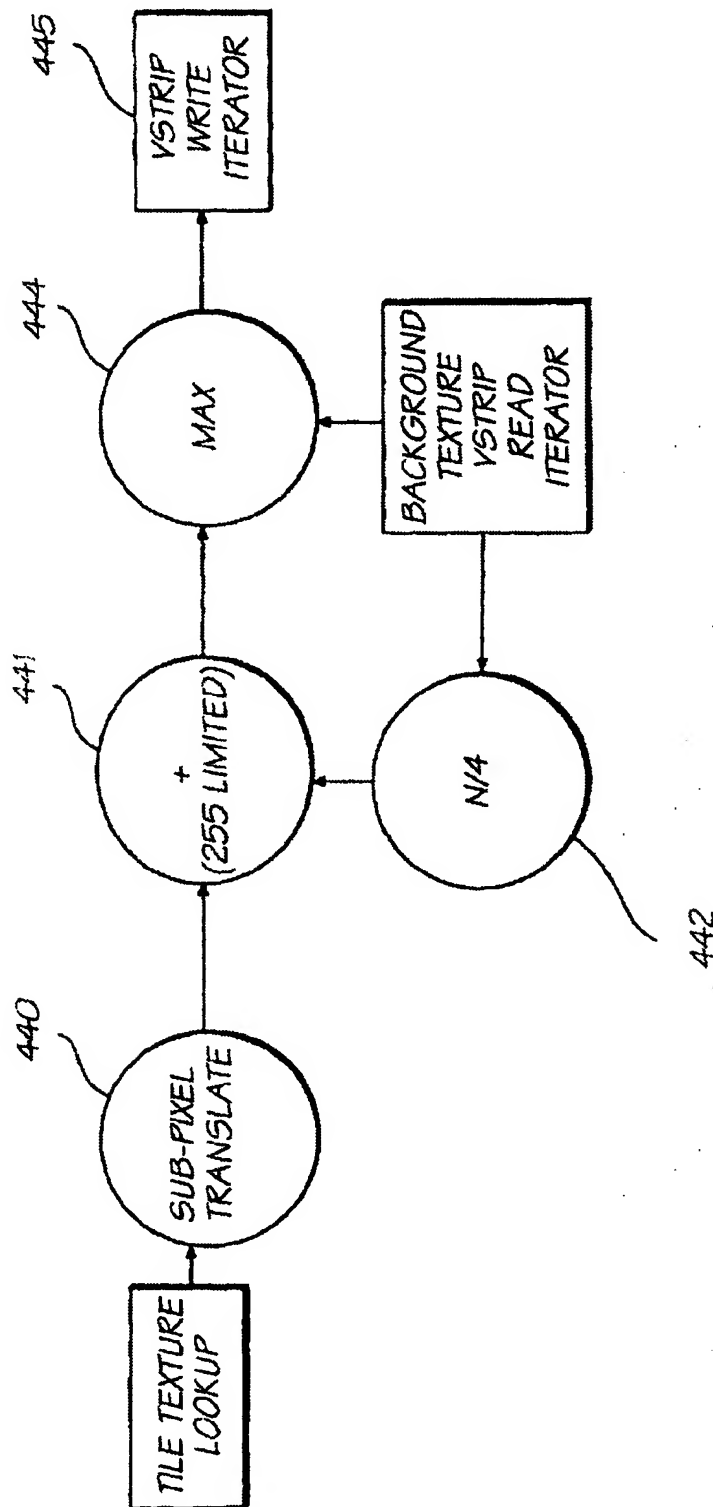


FIG. 108

U.S. Patent

Dec. 25, 2007

Sheet 62 of 149

7,312,845 B2

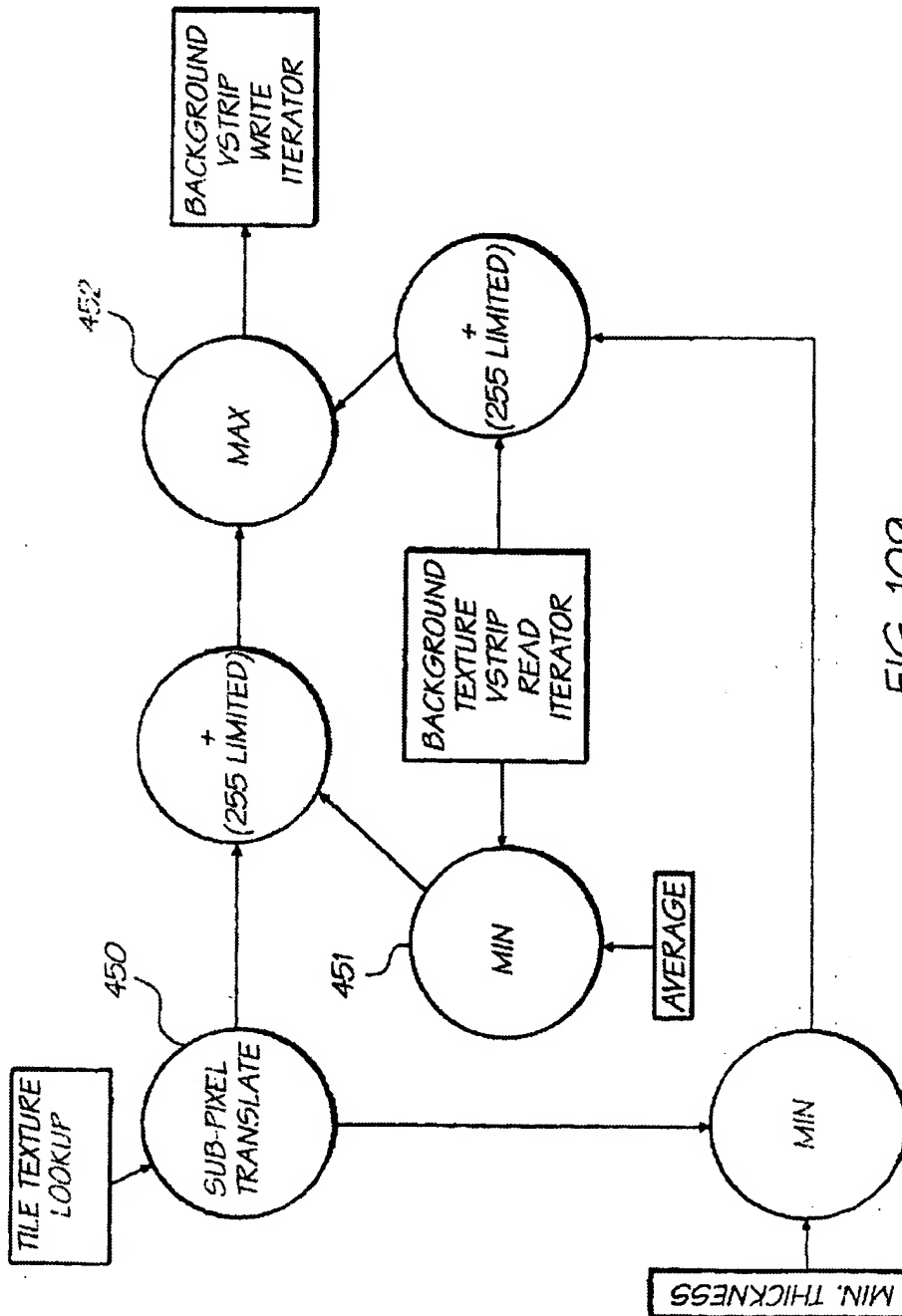


FIG. 109

U.S. Patent

Dec. 25, 2007

Sheet 63 of 149

7,312,845 B2

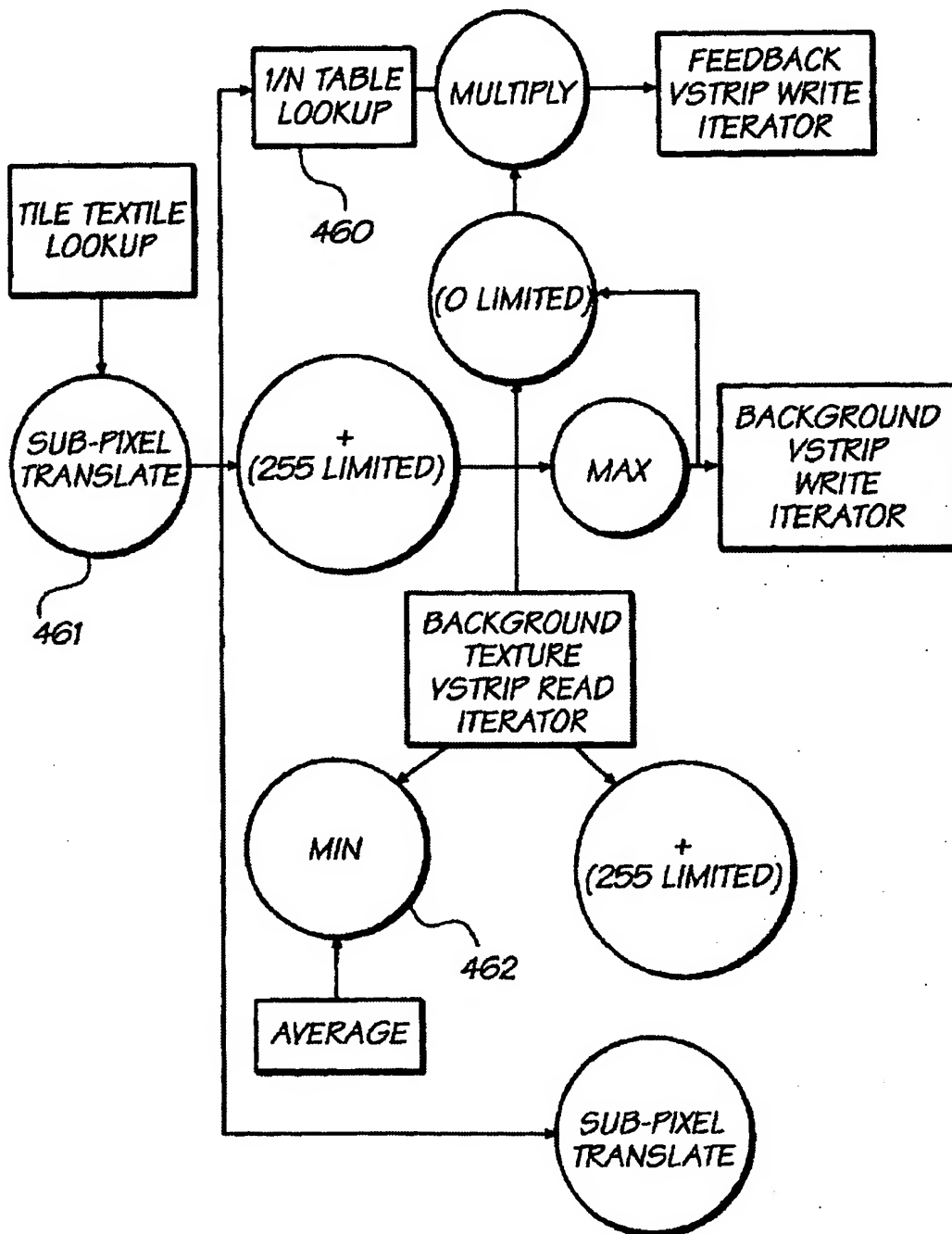


FIG. 110

U.S. Patent

Dec. 25, 2007

Sheet 64 of 149

7,312,845 B2

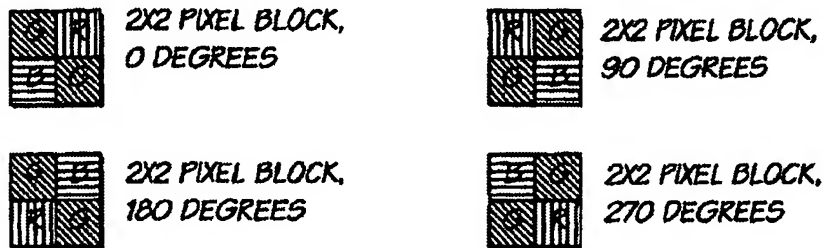
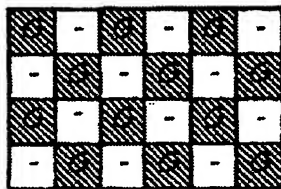


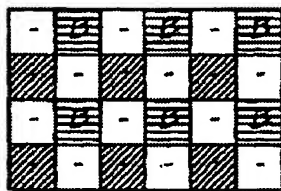
FIG. 111



□ LINEAR INTERPOLATED PIXELS

▨ ACTUAL PIXELS (NOT INTERPOLATED)

FIG. 112

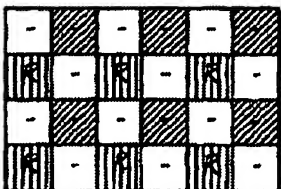


□ LINEAR INTERPOLATED PIXELS

▨ BI-LINEAR INTERPOLATED PIXELS

▤ ACTUAL PIXELS (NOT INTERPOLATED)

FIG. 113



□ LINEAR INTERPOLATED PIXELS

▨ BI-LINEAR INTERPOLATED PIXELS

▤ ACTUAL PIXELS (NOT INTERPOLATED)

FIG. 114

U.S. Patent

Dec. 25, 2007

Sheet 65 of 149

7,312,845 B2

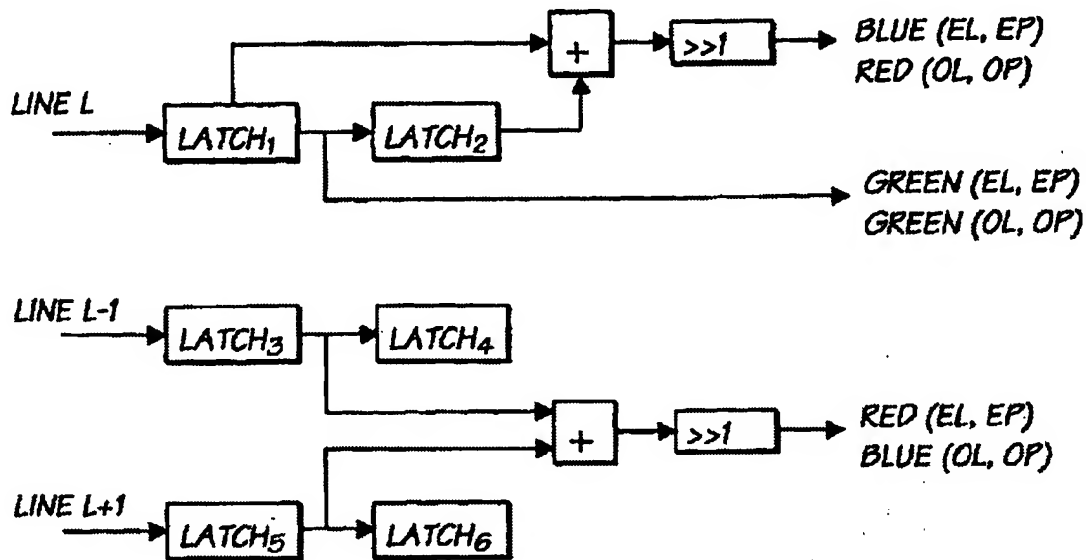


FIG. 115

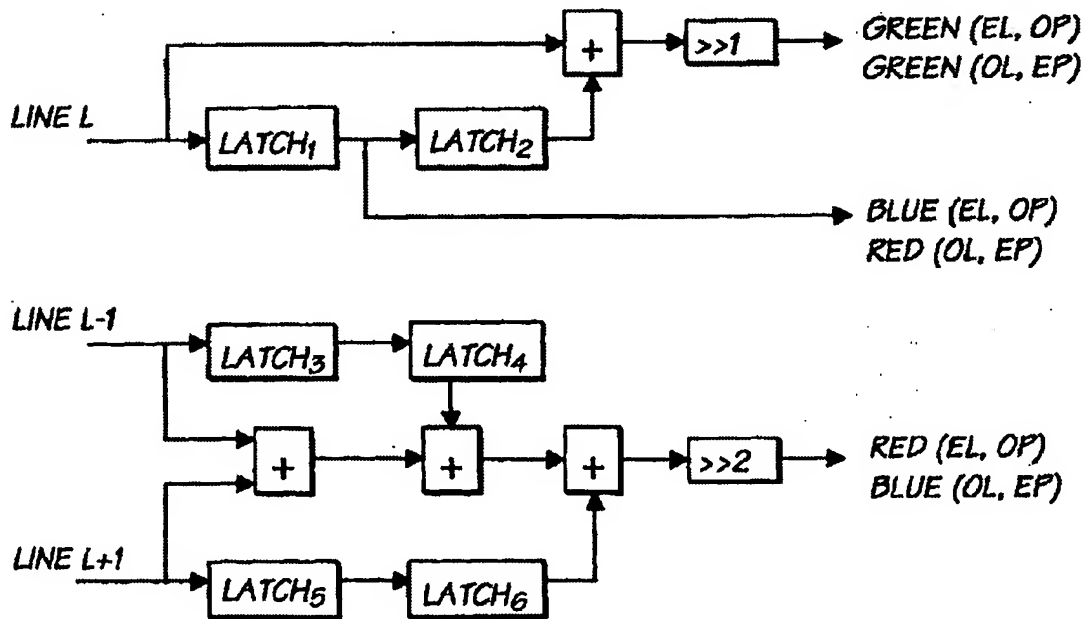


FIG. 116

U.S. Patent

Dec. 25, 2007

Sheet 66 of 149

7,312,845 B2

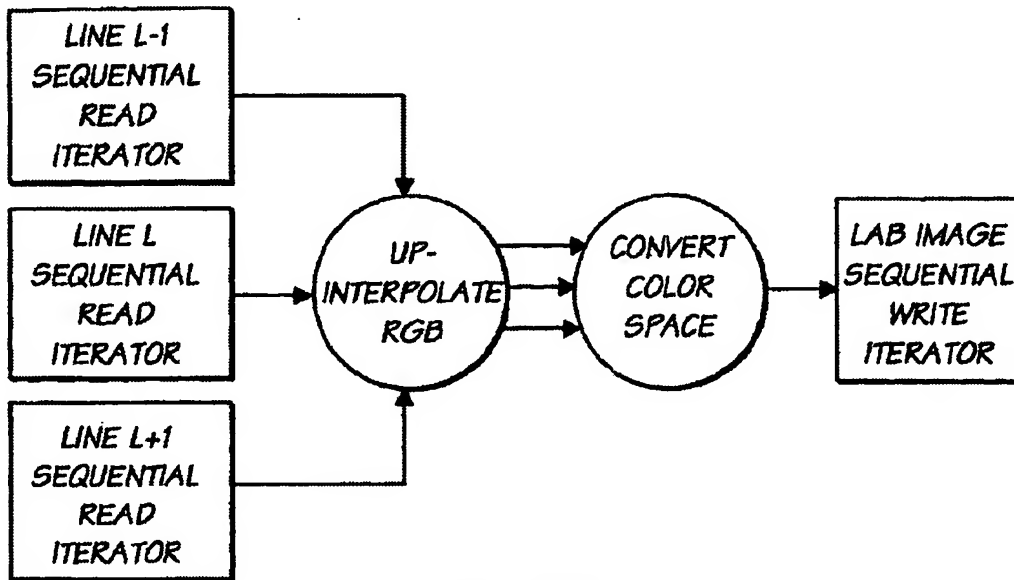


FIG. 117

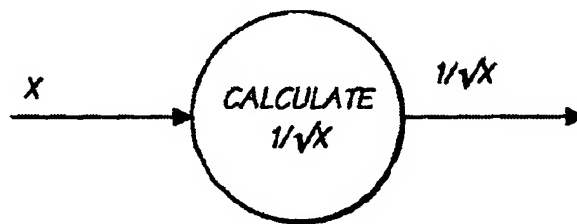


FIG. 118

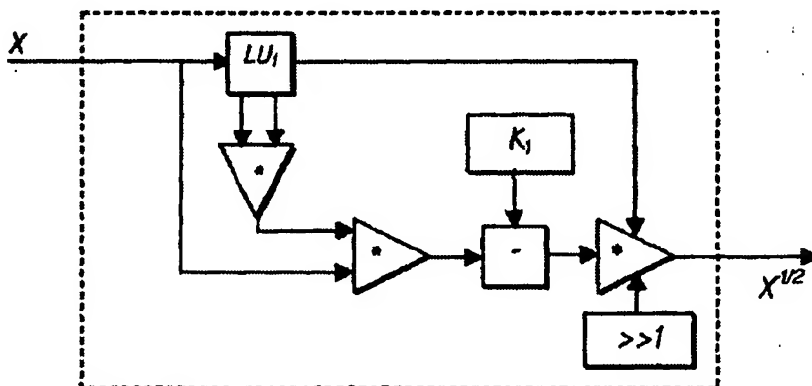


FIG. 119

U.S. Patent

Dec. 25, 2007

Sheet 67 of 149

7,312,845 B2

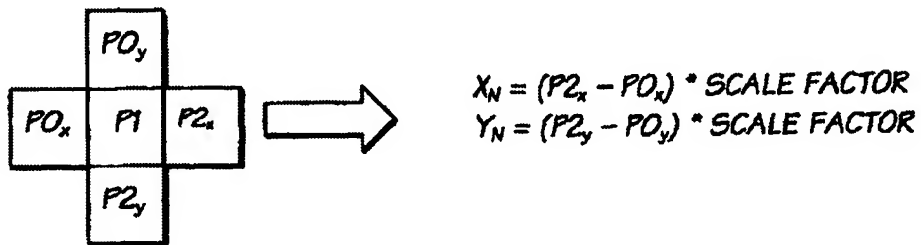


FIG. 120

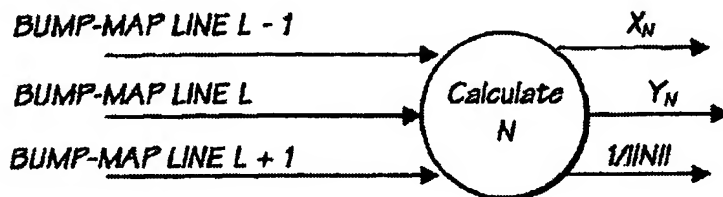


FIG. 121

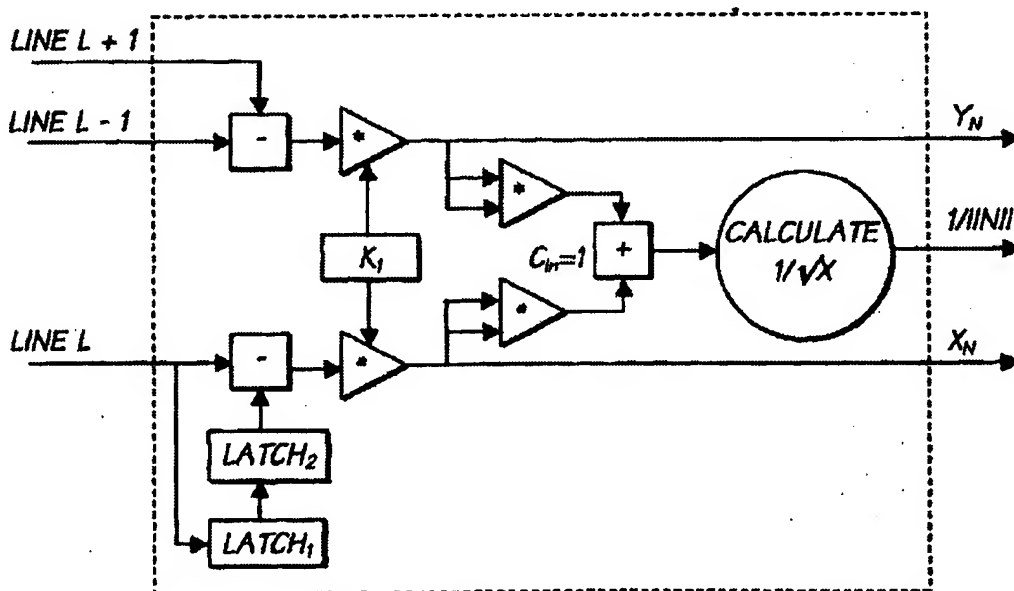


FIG. 122

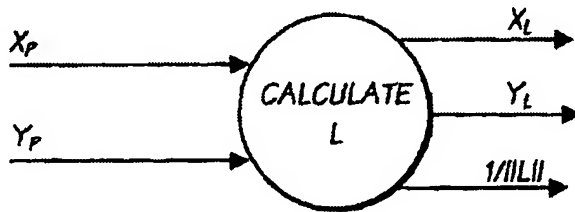


FIG. 123

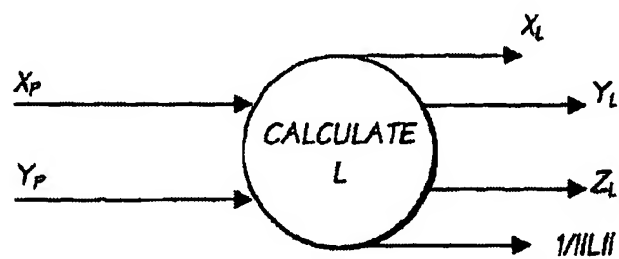


FIG. 124

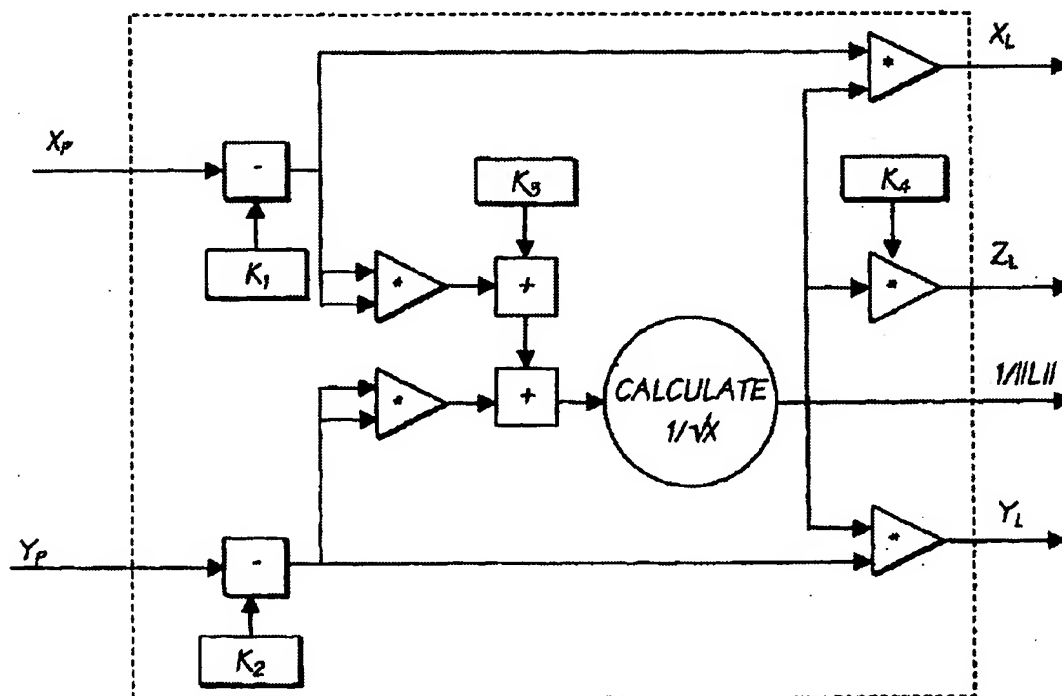


FIG. 125

U.S. Patent

Dec. 25, 2007

Sheet 69 of 149

7,312,845 B2

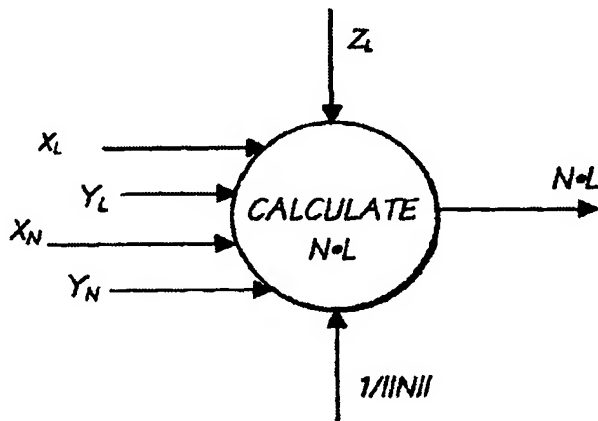


FIG. 126

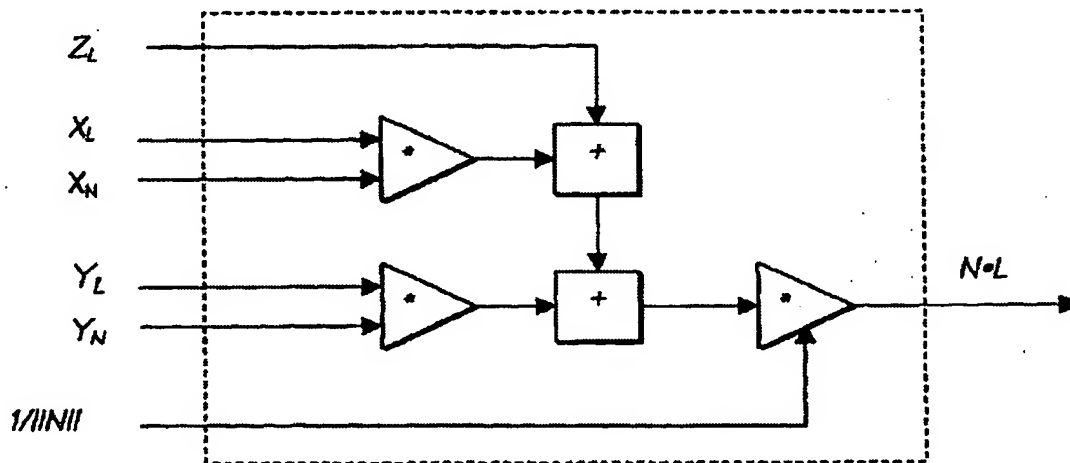


FIG. 127

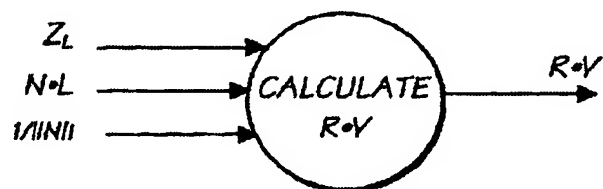


FIG. 128

U.S. Patent

Dec. 25, 2007

Sheet 70 of 149

7,312,845 B2

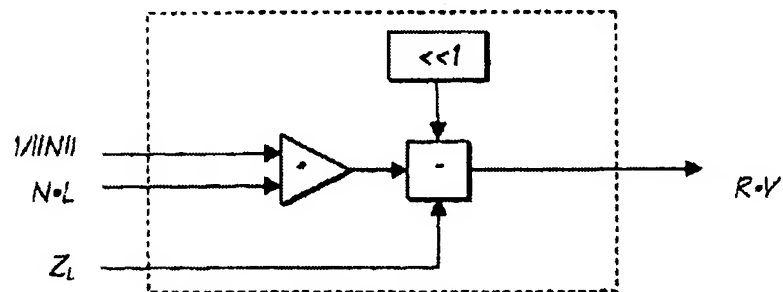


FIG. 129

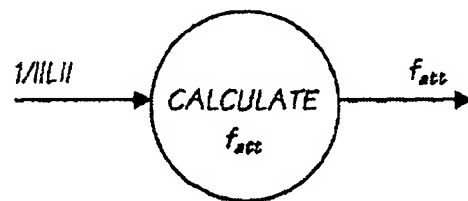


FIG. 130

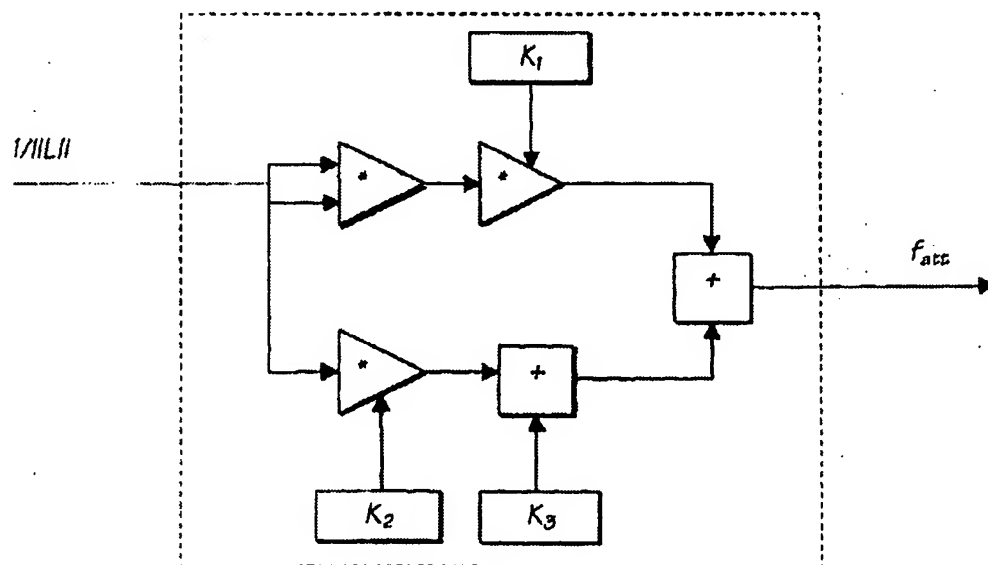


FIG. 131

U.S. Patent

Dec. 25, 2007

Sheet 71 of 149

7,312,845 B2



FIG. 132

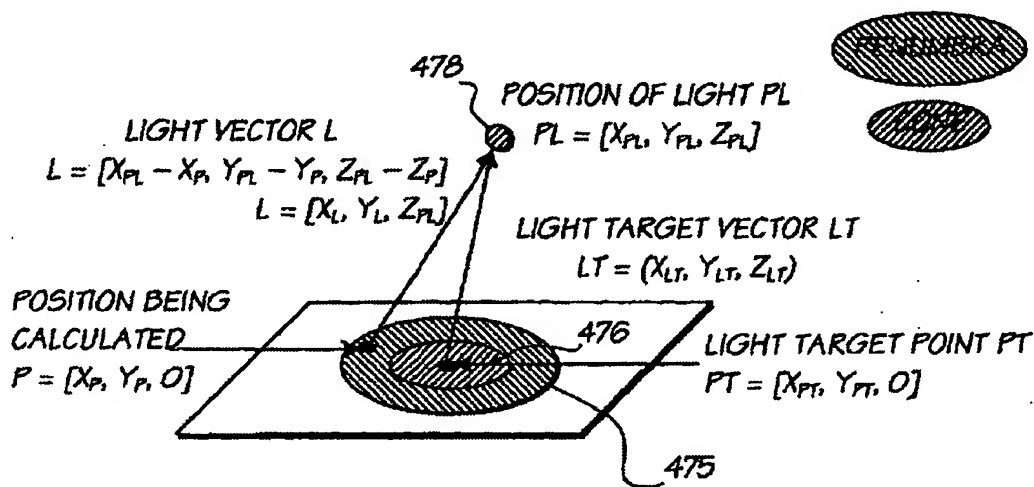


FIG. 133

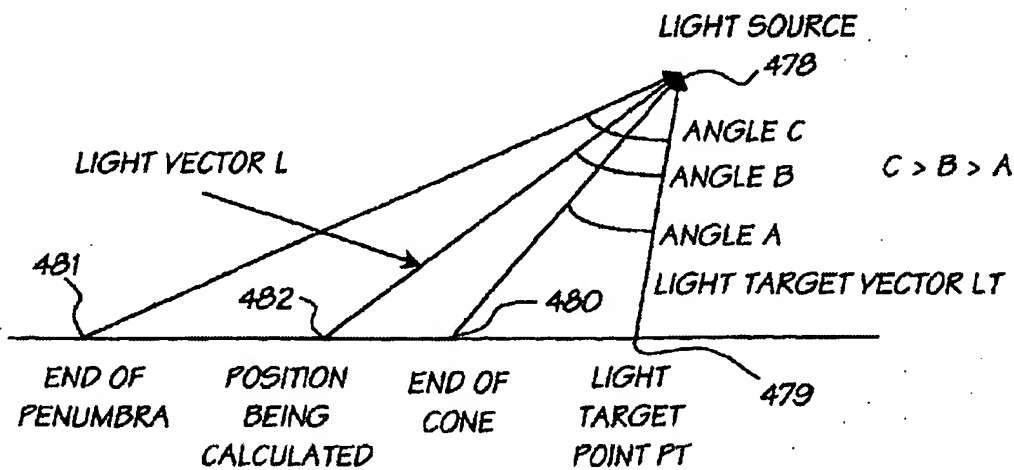


FIG. 134

U.S. Patent

Dec. 25, 2007

Sheet 72 of 149

7,312,845 B2

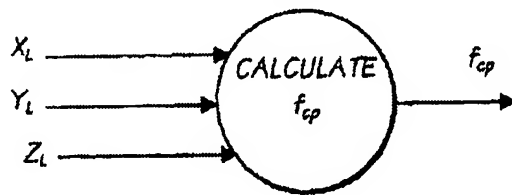


FIG. 135

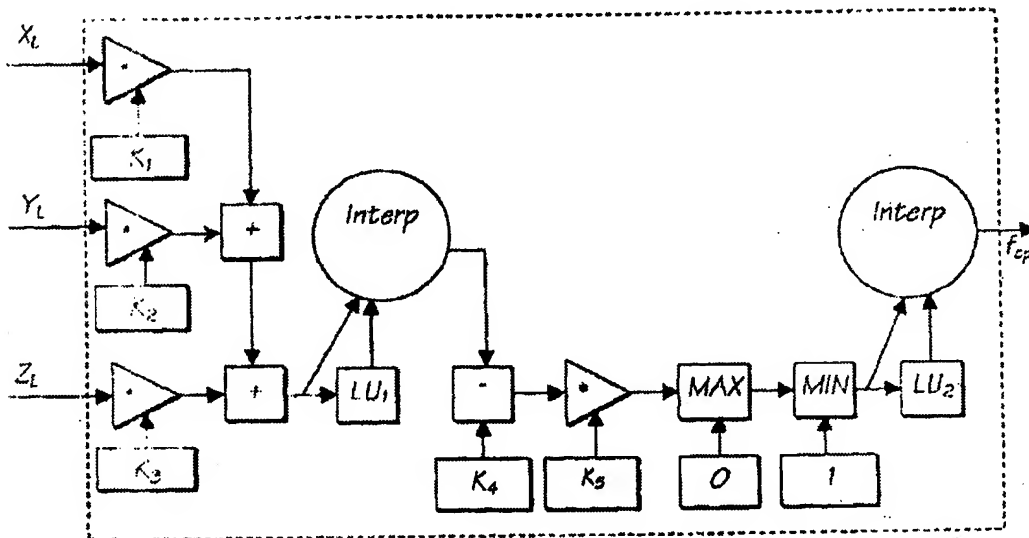


FIG. 136

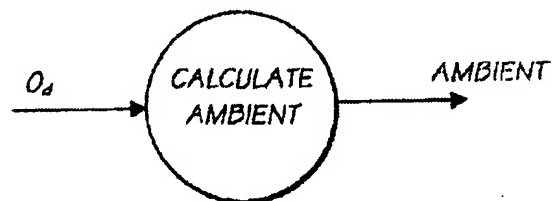


FIG. 137

U.S. Patent

Dec. 25, 2007

Sheet 73 of 149

7,312,845 B2

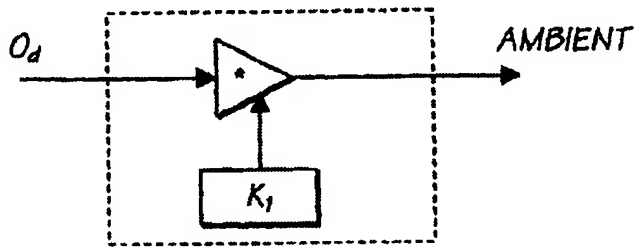


FIG. 138

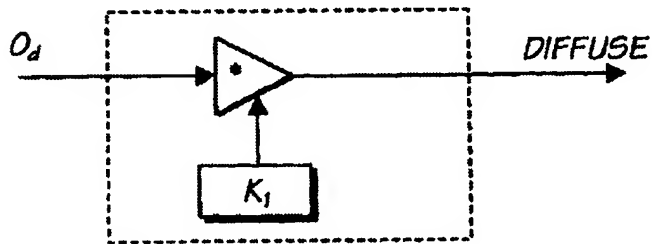


FIG. 139

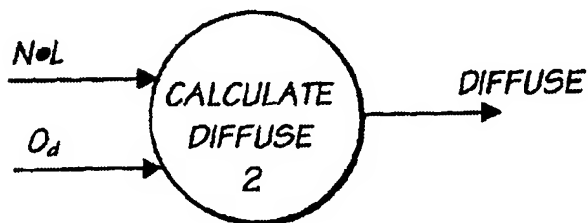


FIG. 140

U.S. Patent

Dec. 25, 2007

Sheet 74 of 149

7,312,845 B2

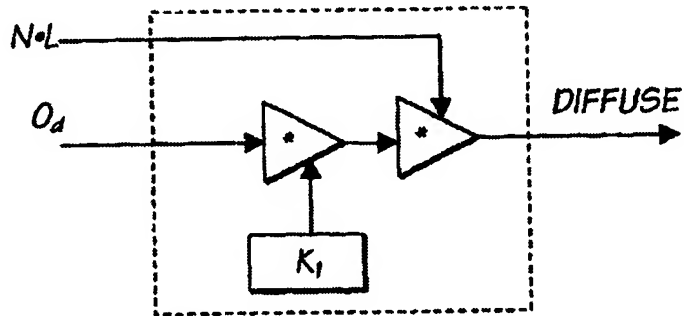


FIG. 141

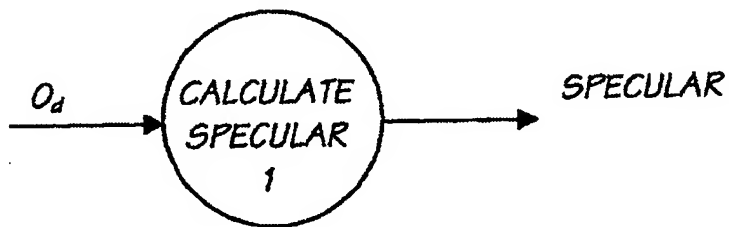


FIG. 142

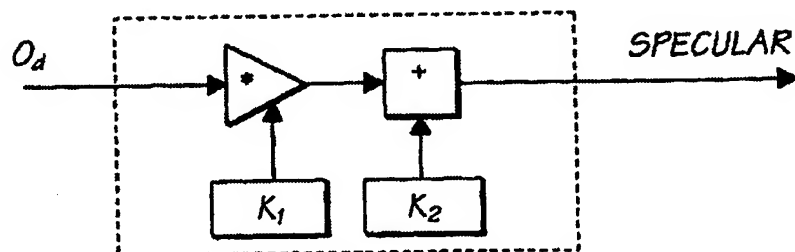


FIG. 143

U.S. Patent

Dec. 25, 2007

Sheet 75 of 149

7,312,845 B2

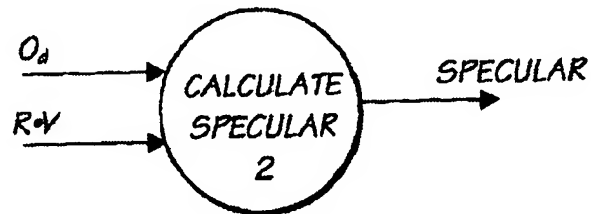


FIG. 144

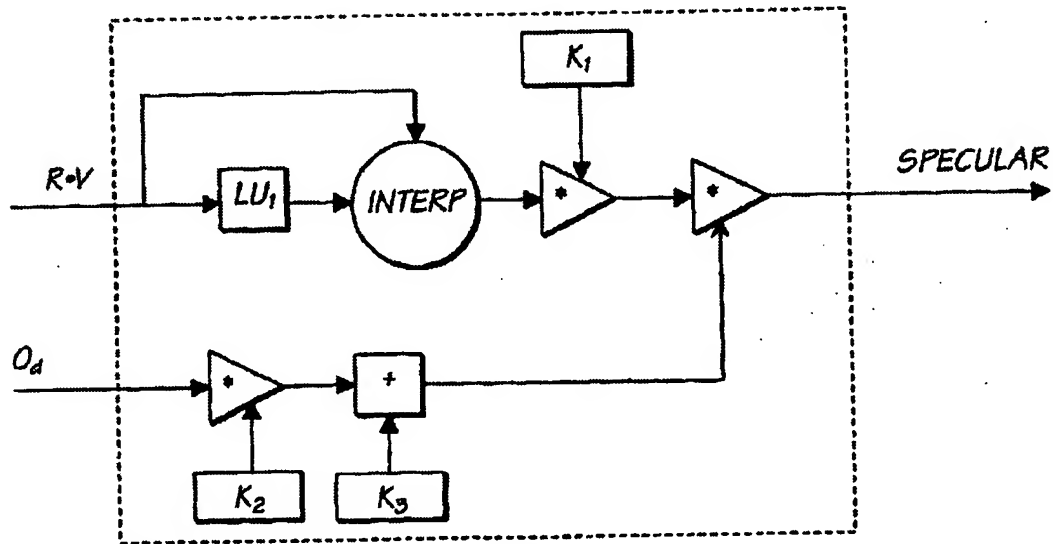


FIG. 145

U.S. Patent

Dec. 25, 2007

Sheet 76 of 149

7,312,845 B2

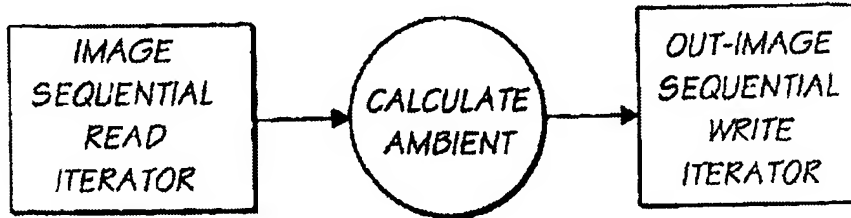


FIG. 146

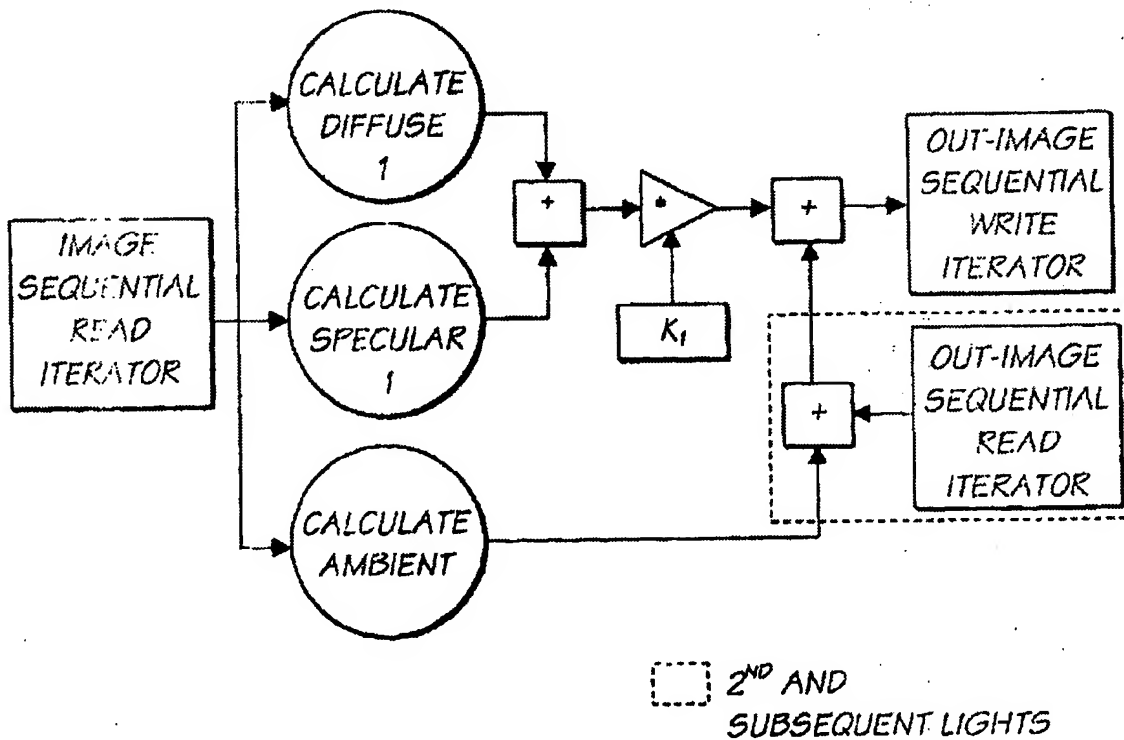


FIG. 147

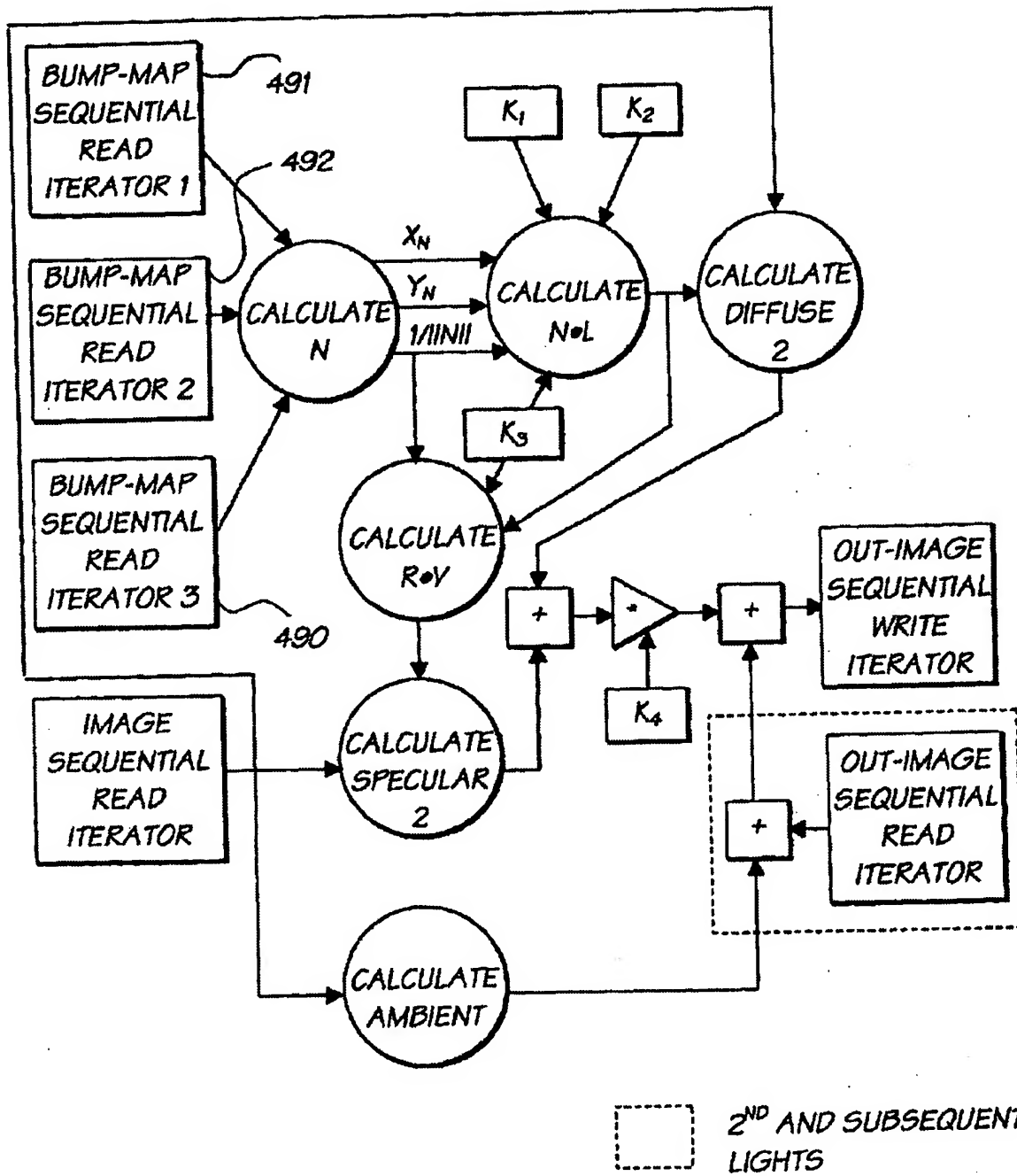
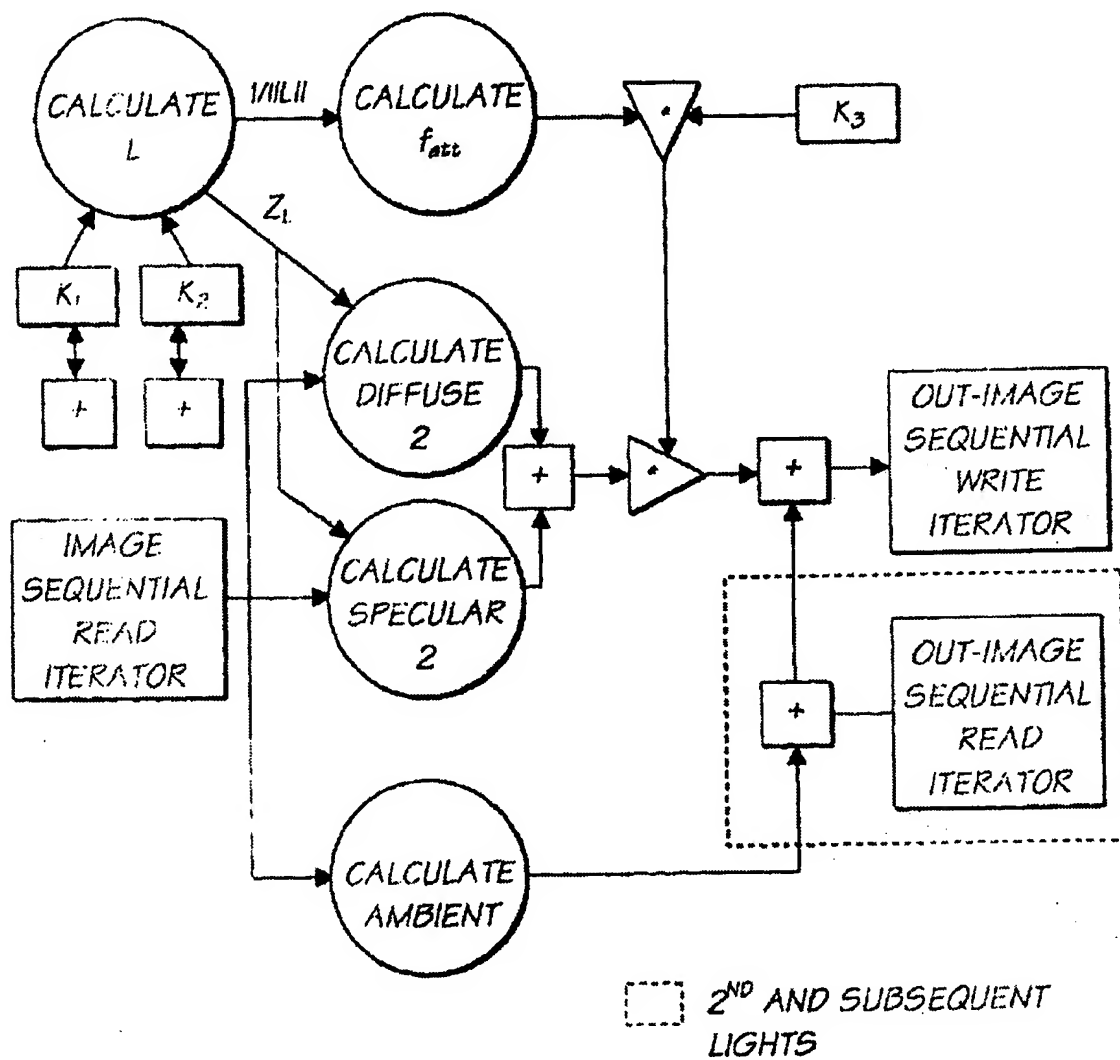


FIG. 148



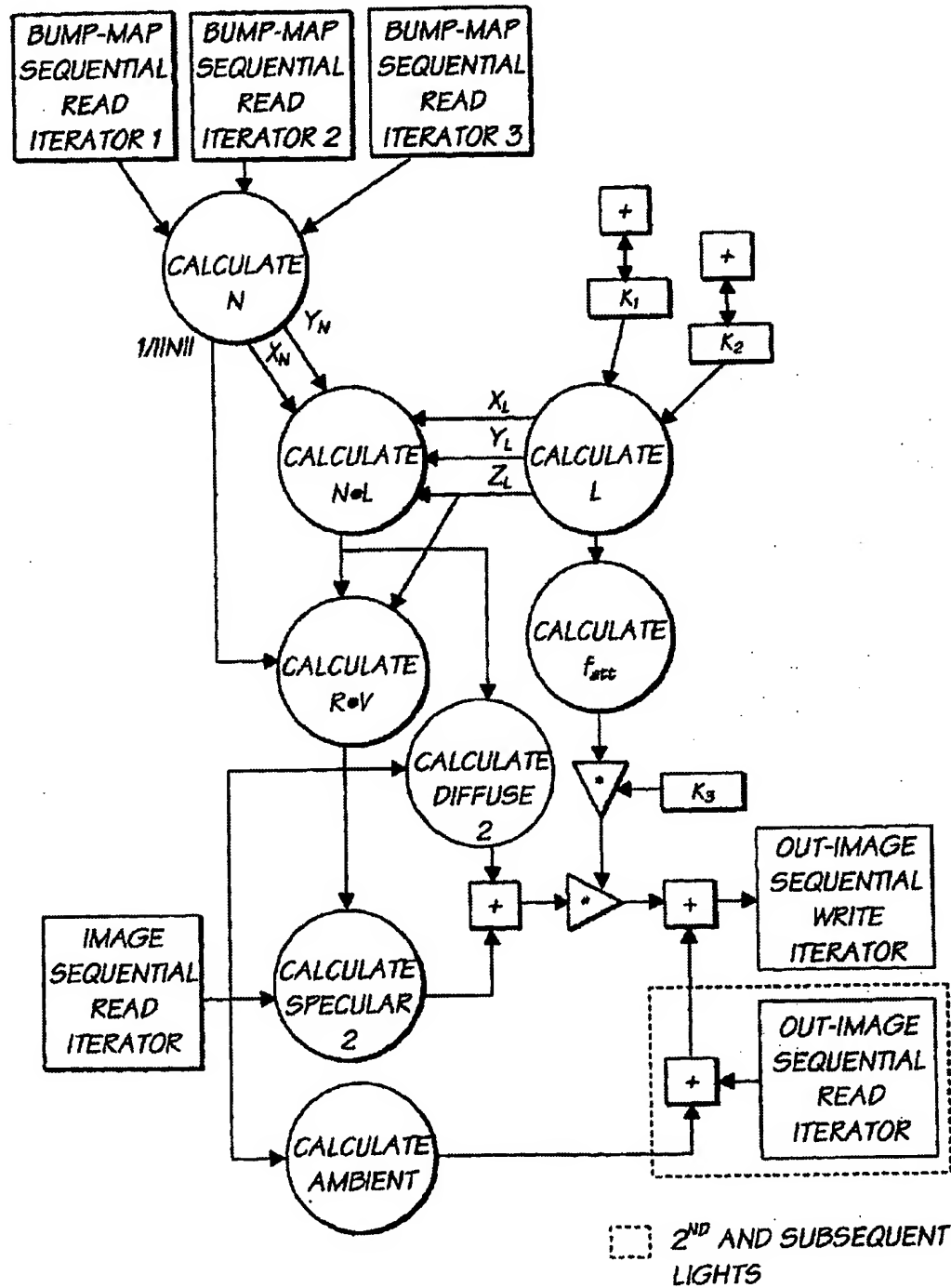


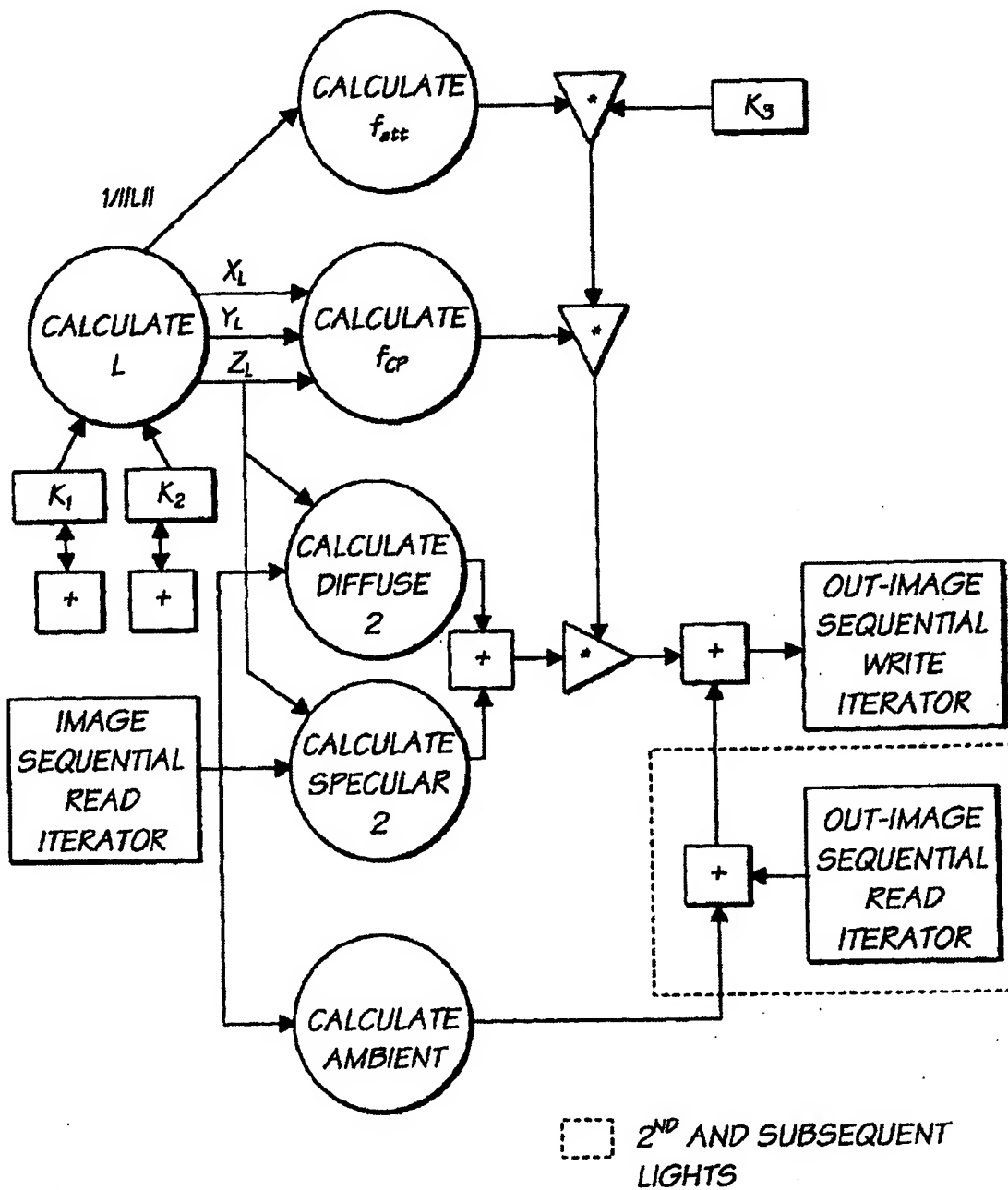
FIG. 150

U.S. Patent

Dec. 25, 2007

Sheet 80 of 149

7,312,845 B2



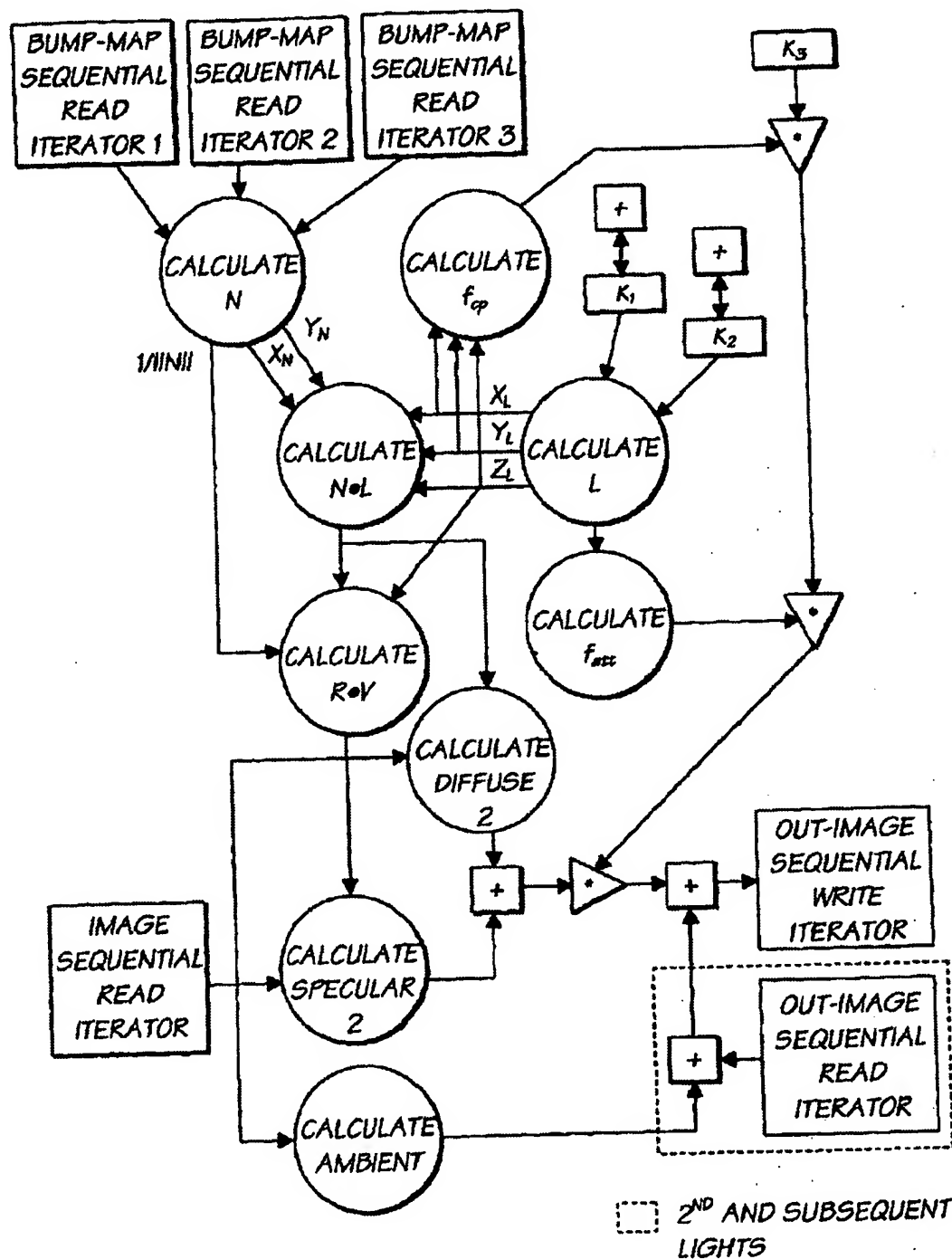


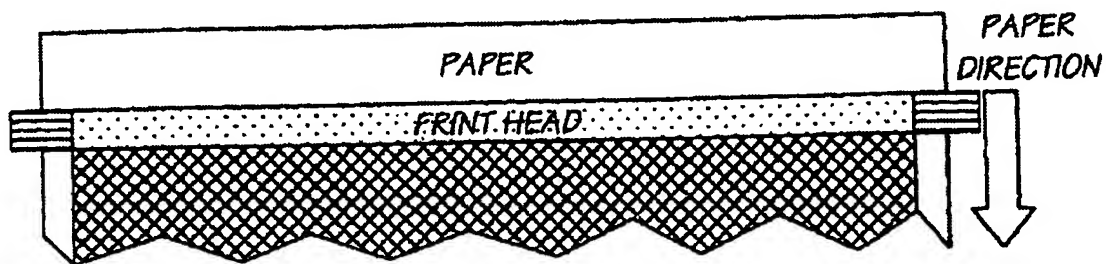
FIG. 152

U.S. Patent

Dec. 25, 2007

Sheet 82 of 149

7,312,845 B2



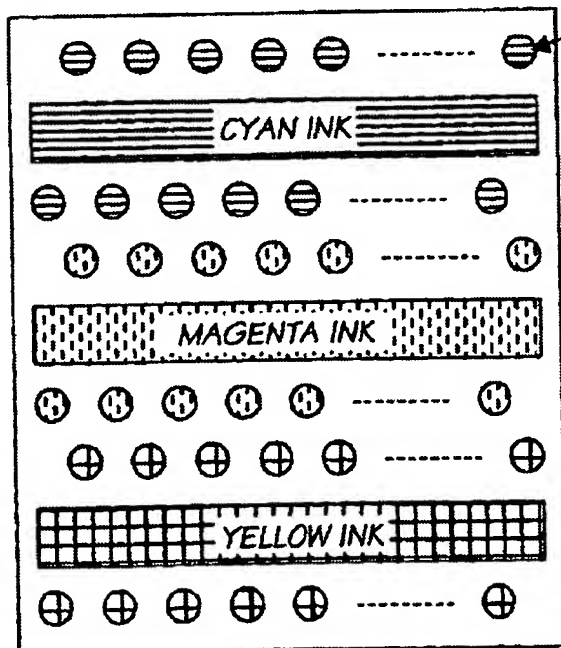
8 PRINT HEAD SEGMENTS IN PRINT HEAD

SEGMENT	SEGMENT	SEGMENT	SEGMENT	SEGMENT	SEGMENT	SEGMENT	SEGMENT
0	1	2	3	4	5	6	7

1250 μm (375 DOTS PER SEGMENT ROW,
OR 750 DOTS PER SEGMENT COLOR)

1 DOT IS 16.6 μm IN
DIAMETER

(A 100 μm SQUARE =
6 X 6 = 36 DOTS)



466.6 μm
(28 DOTS)

33.3 μm
(2 DOTS)

133.3 μm
(8 DOTS)

EACH SEGMENT CONTAINS 6 ROWS OF DOTS:
ODD AND EVEN CYAN, MAGENTA, AND YELLOW.

FIG. 153

U.S. Patent

Dec. 25, 2007

Sheet 83 of 149

7,312,845 B2

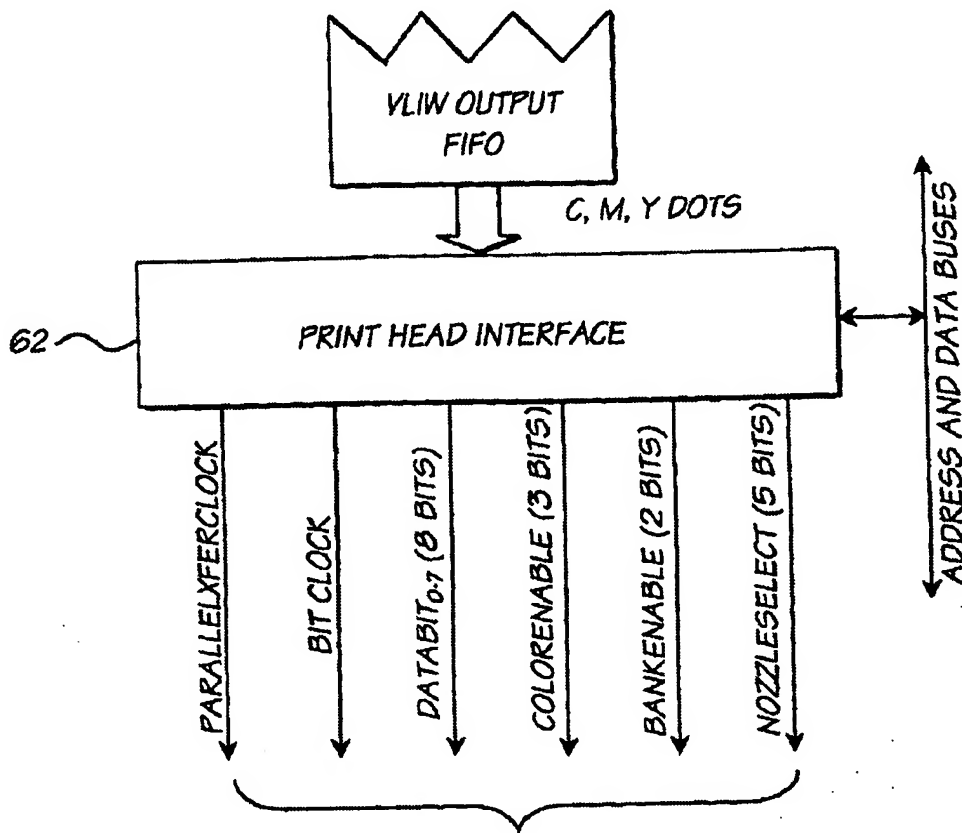


FIG. 154

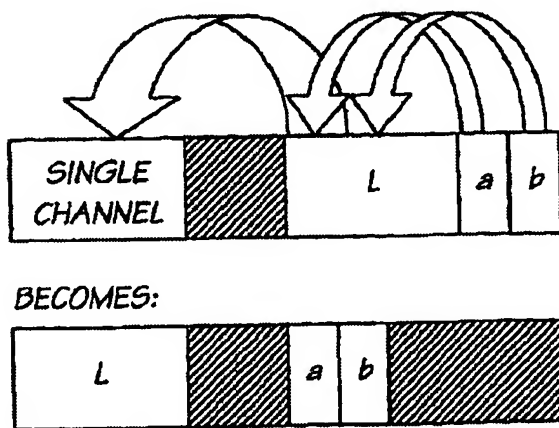


FIG. 155

U.S. Patent

Dec. 25, 2007

Sheet 84 of 149

7,312,845 B2

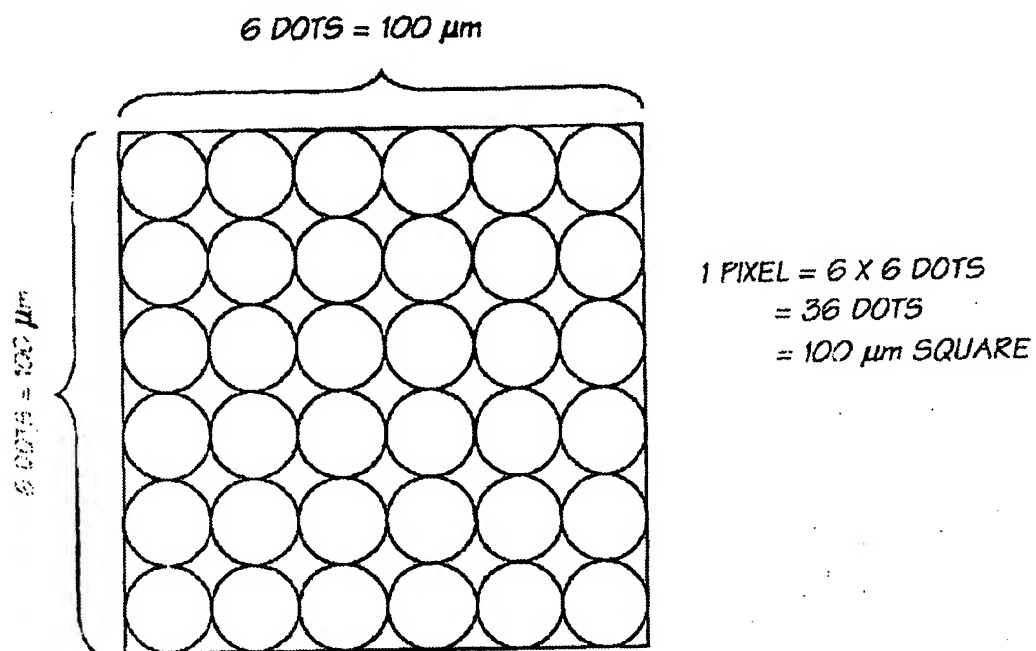


FIG. 156

U.S. Patent

Dec. 25, 2007

Sheet 85 of 149

7,312,845 B2

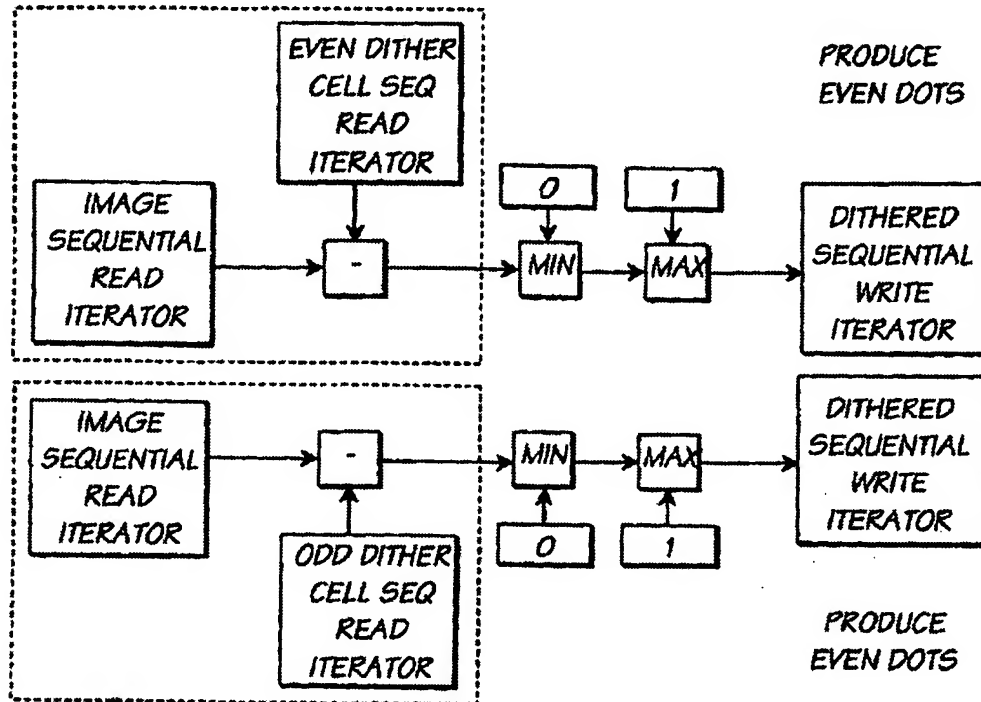


FIG. 157

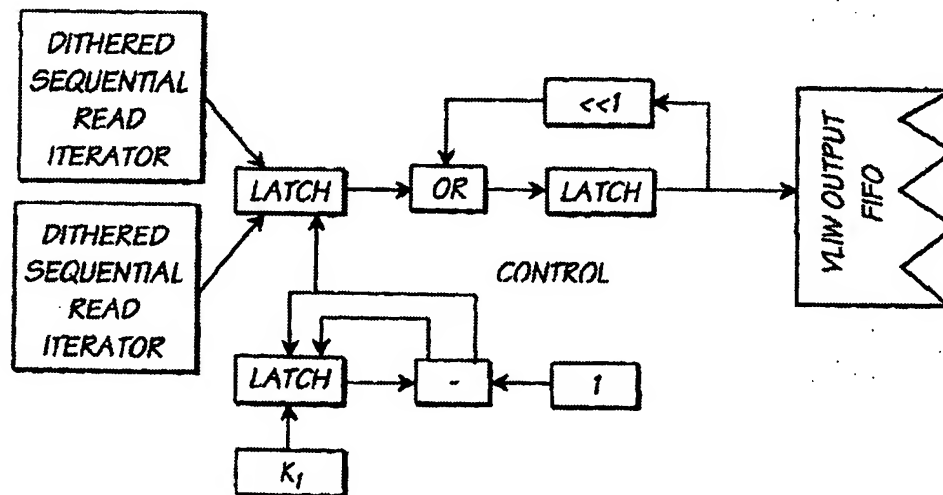


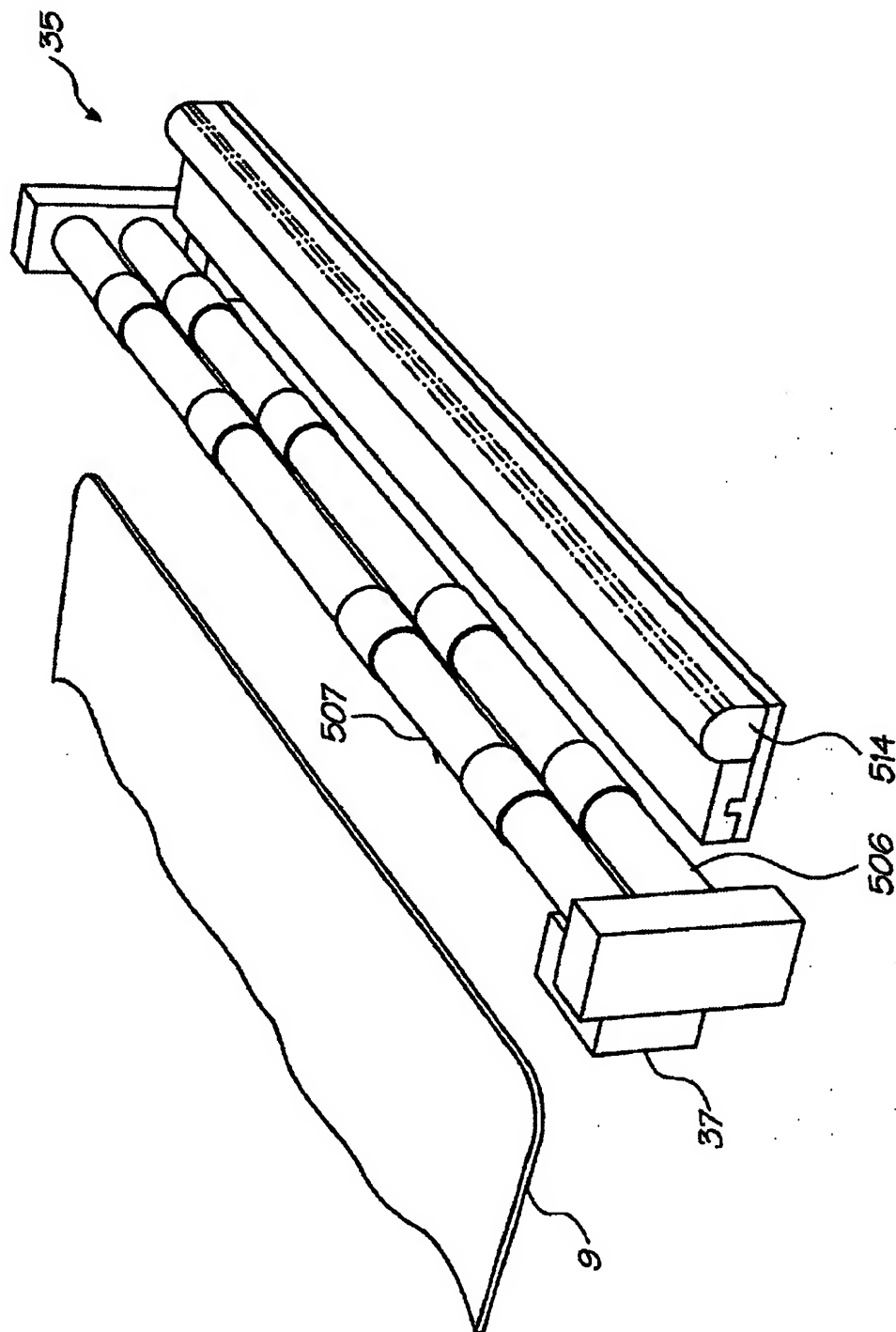
FIG. 158

U.S. Patent

Dec. 25, 2007

Sheet 86 of 149

7,312,845 B2

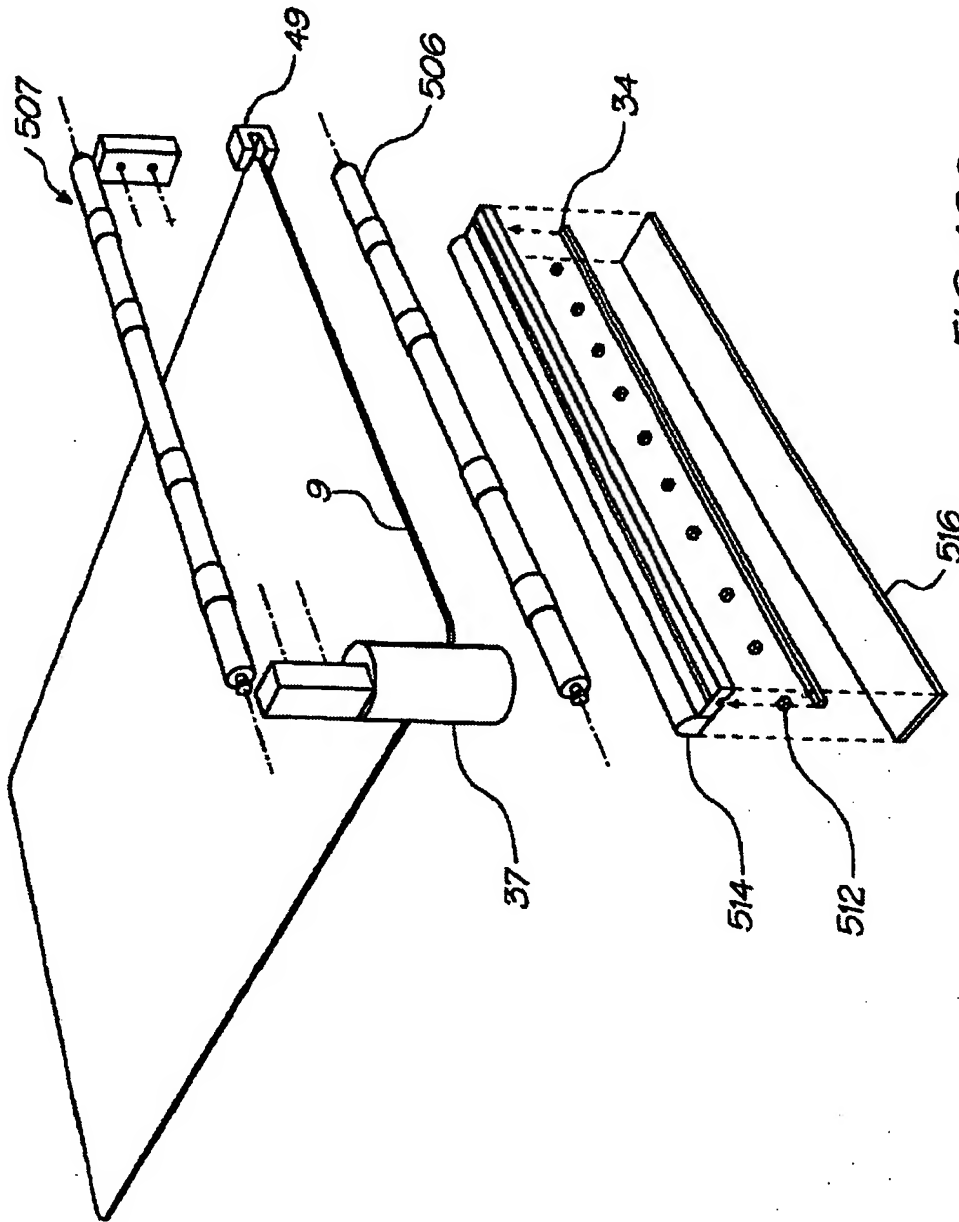


U.S. Patent

Dec. 25, 2007

Sheet 87 of 149

7,312,845 B2

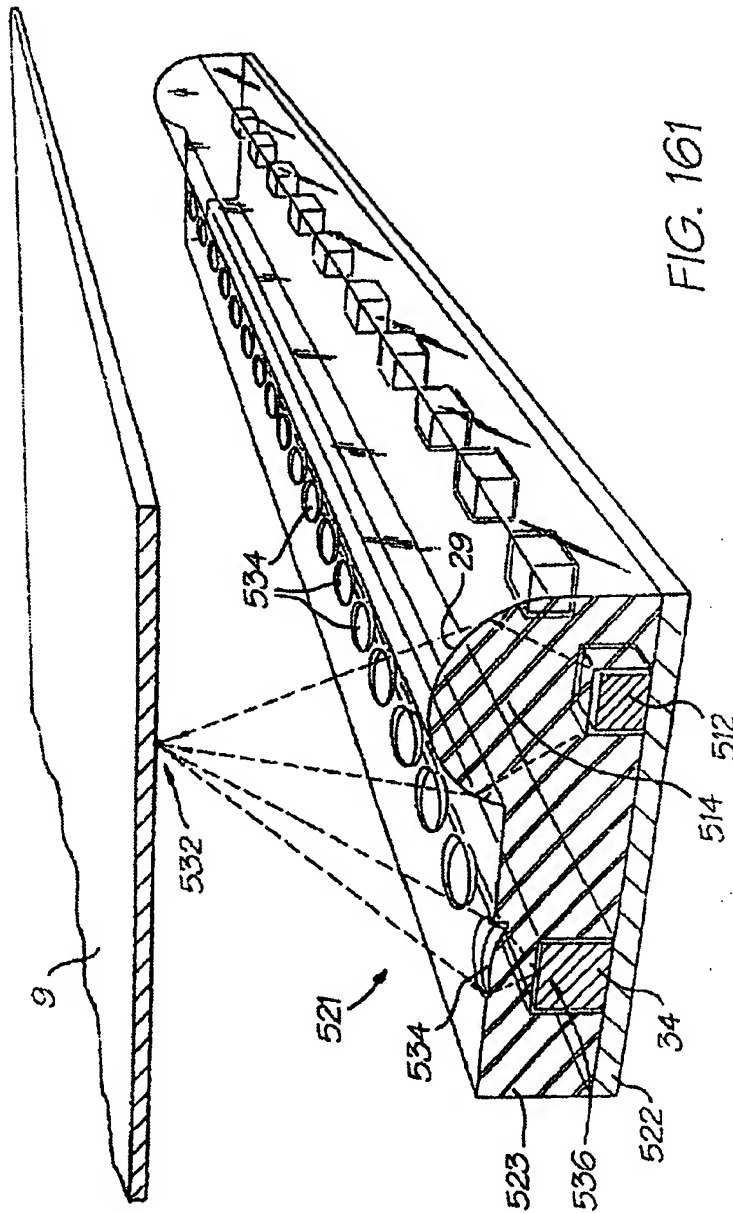


U.S. Patent

Dec. 25, 2007

Sheet 88 of 149

7,312,845 B2



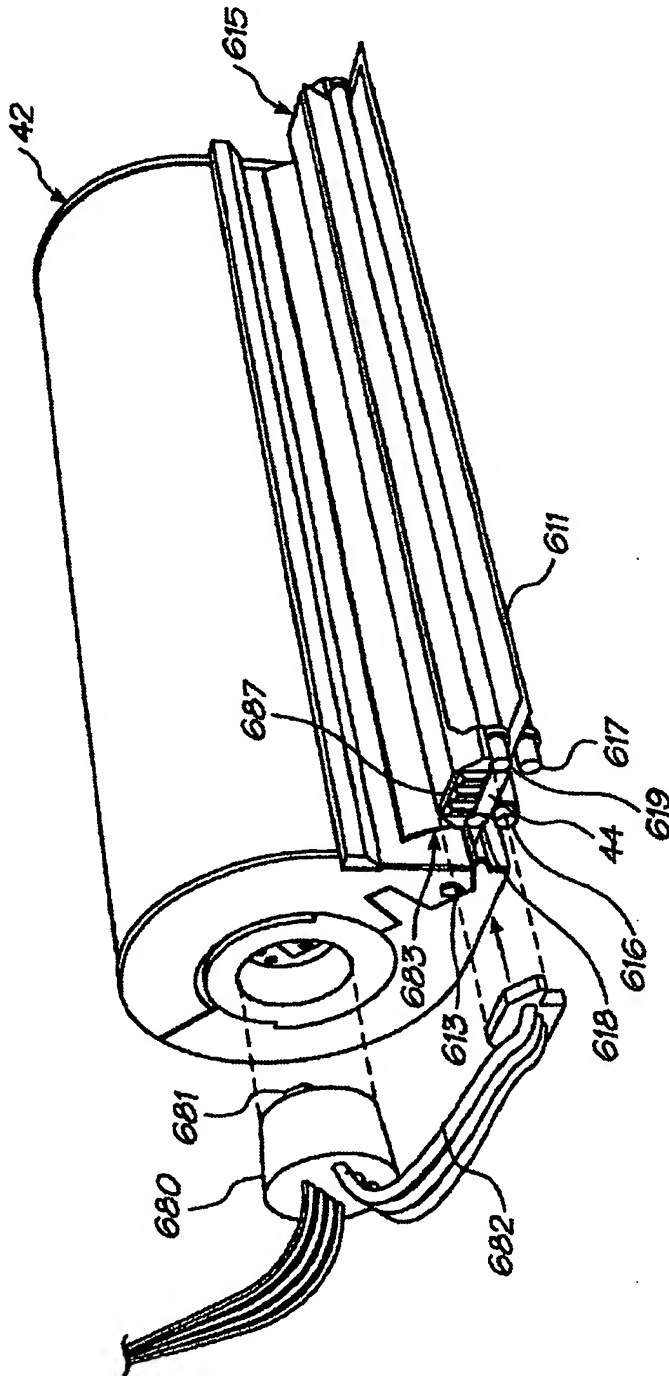


FIG. 162

U.S. Patent

Dec. 25, 2007

Sheet 90 of 149

7,312,845 B2

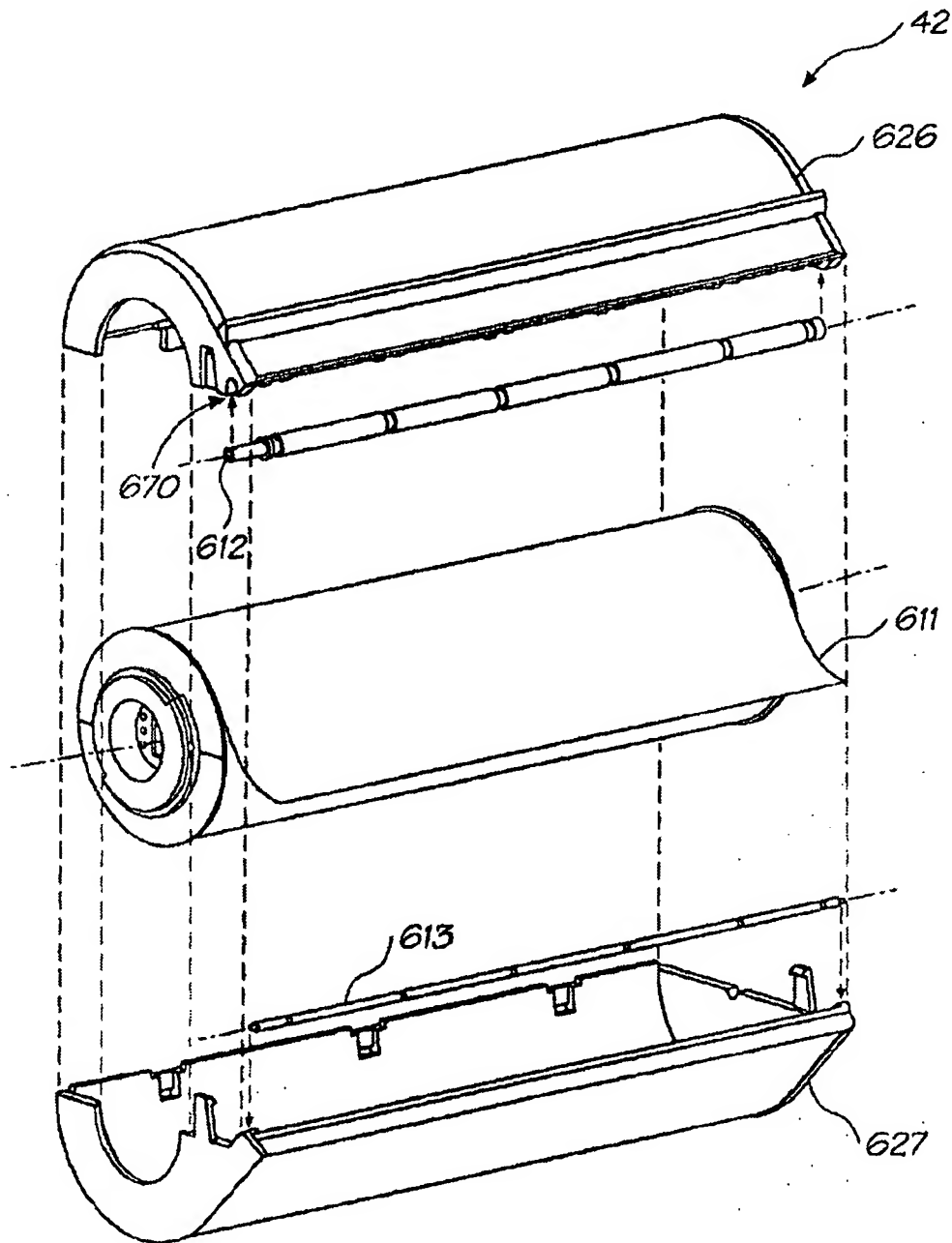


FIG. 163

U.S. Patent

Dec. 25, 2007

Sheet 91 of 149

7,312,845 B2

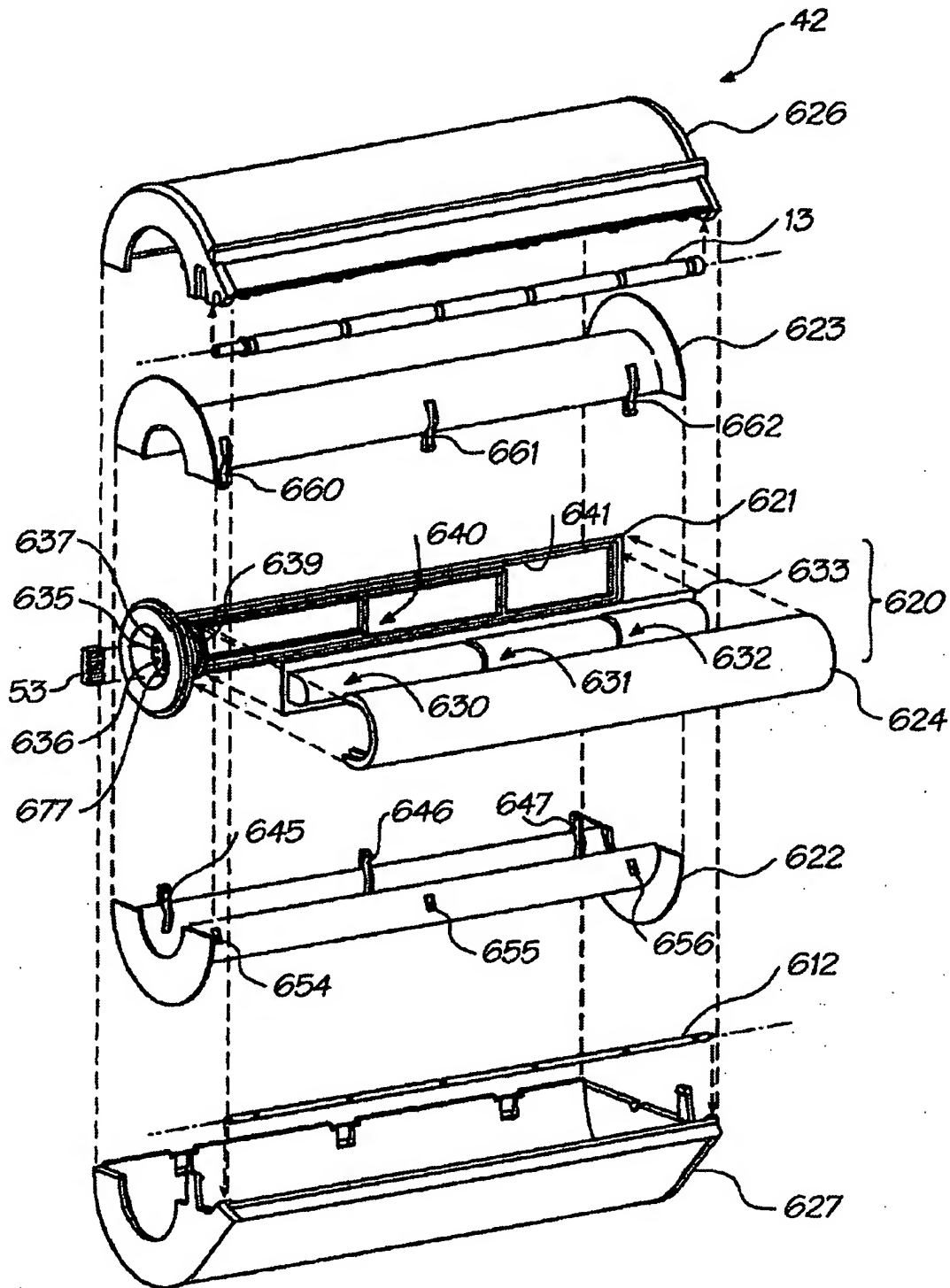


FIG. 164

U.S. Patent

Dec. 25, 2007

Sheet 92 of 149

7,312,845 B2

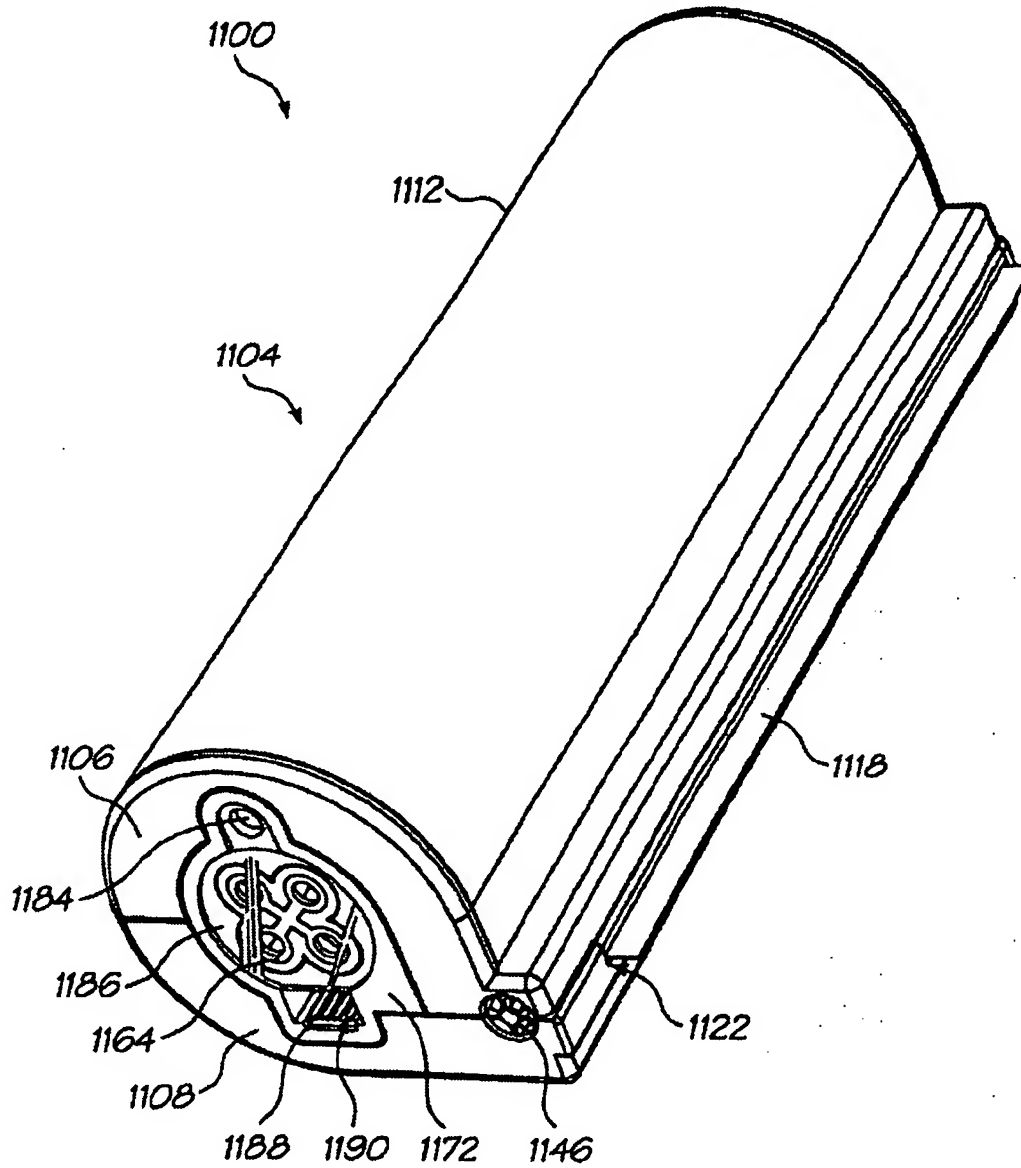


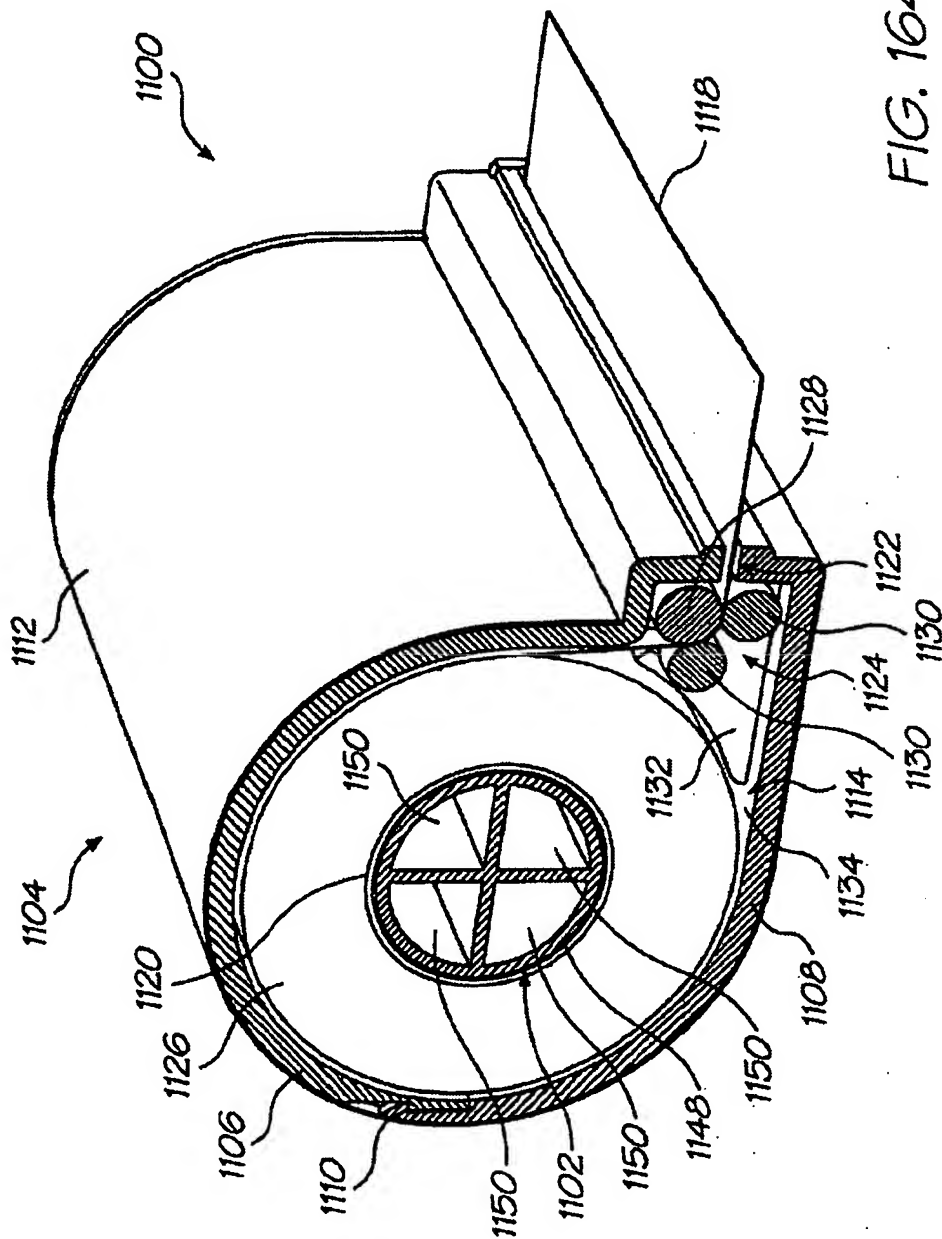
FIG. 164A

U.S. Patent

Dec. 25, 2007

Sheet 93 of 149

7,312,845 B2



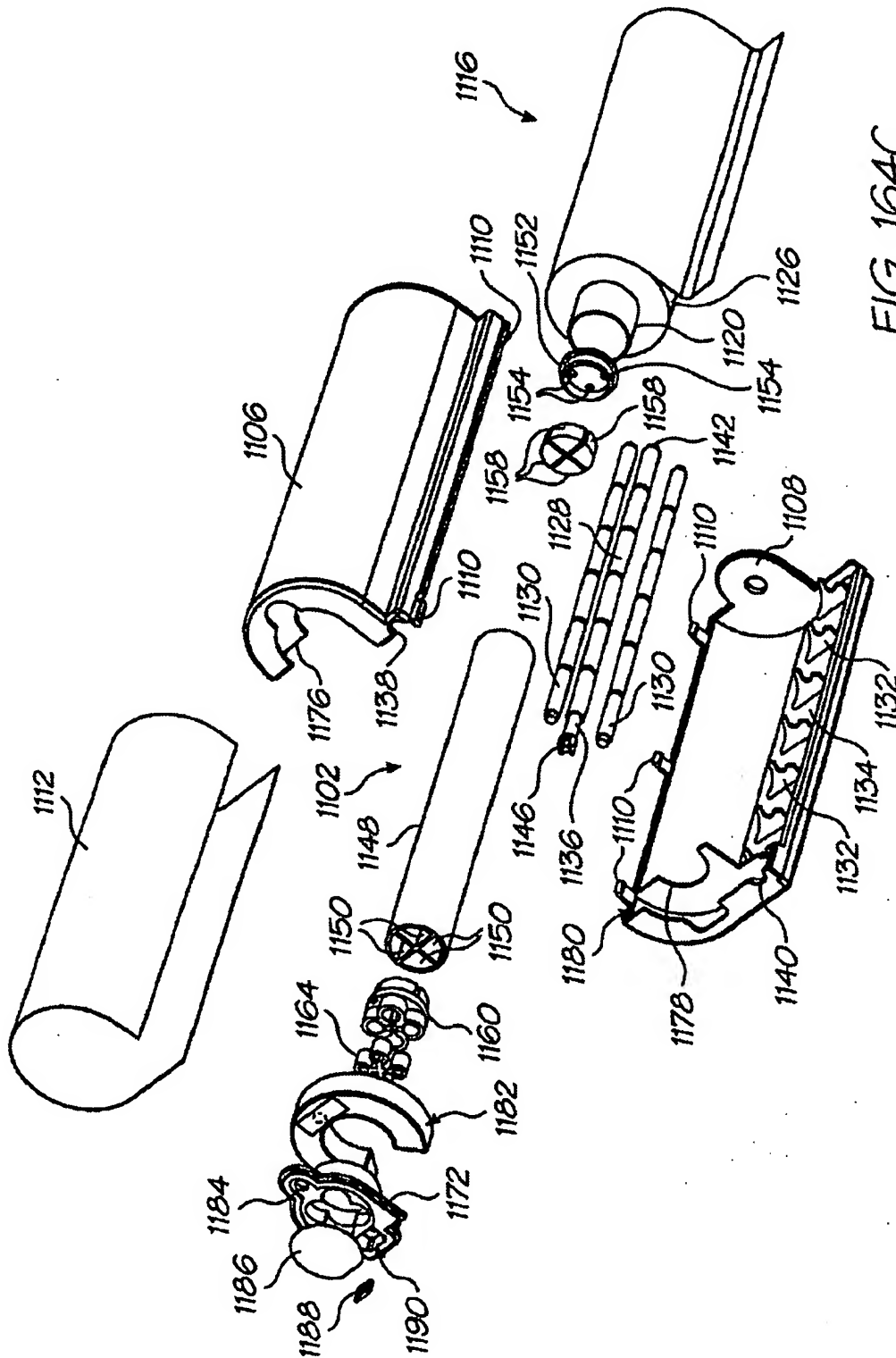


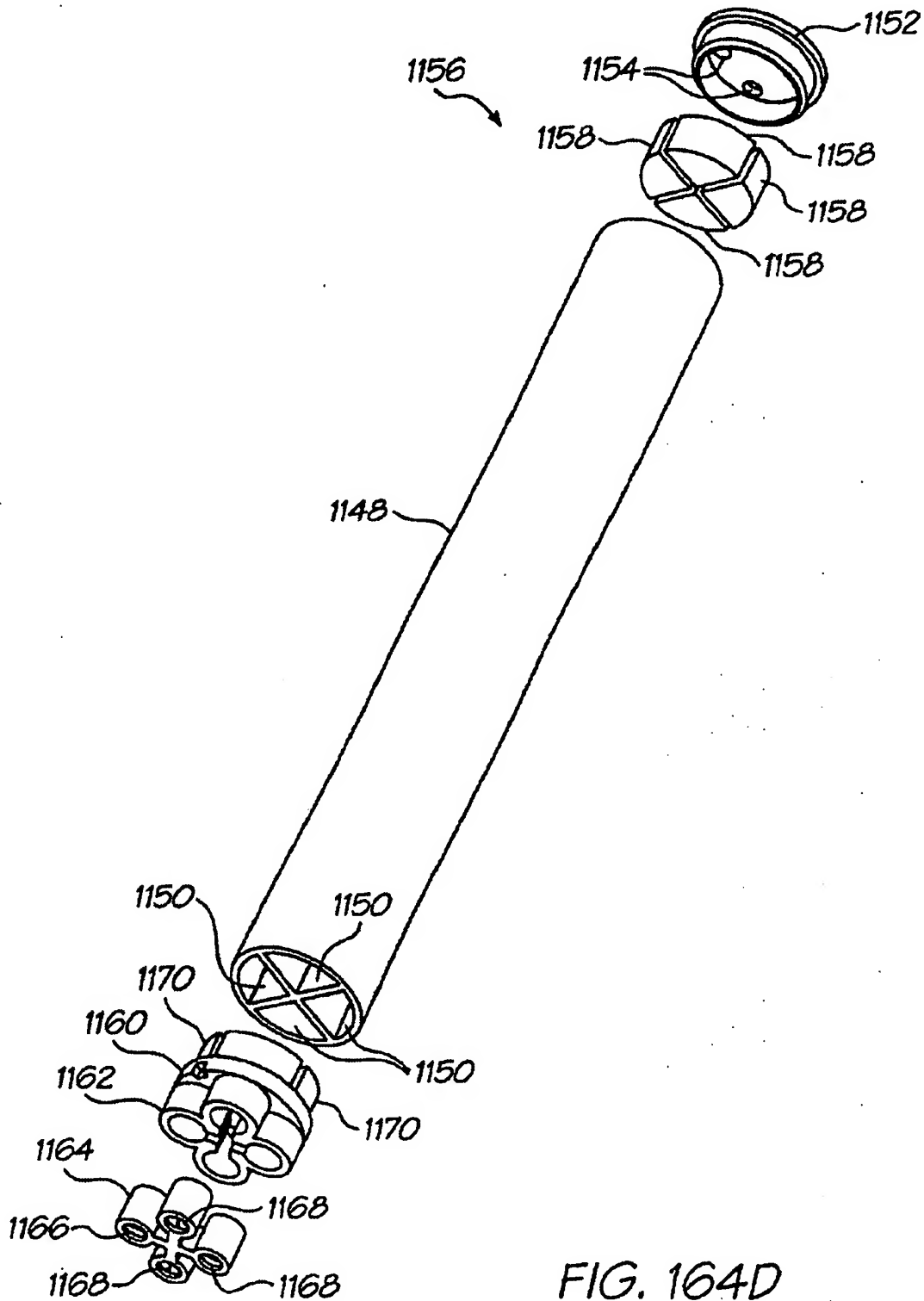
FIG. 164C

U.S. Patent

Dec. 25, 2007

Sheet 95 of 149

7,312,845 B2



U.S. Patent

Dec. 25, 2007

Sheet 96 of 149

7,312,845 B2

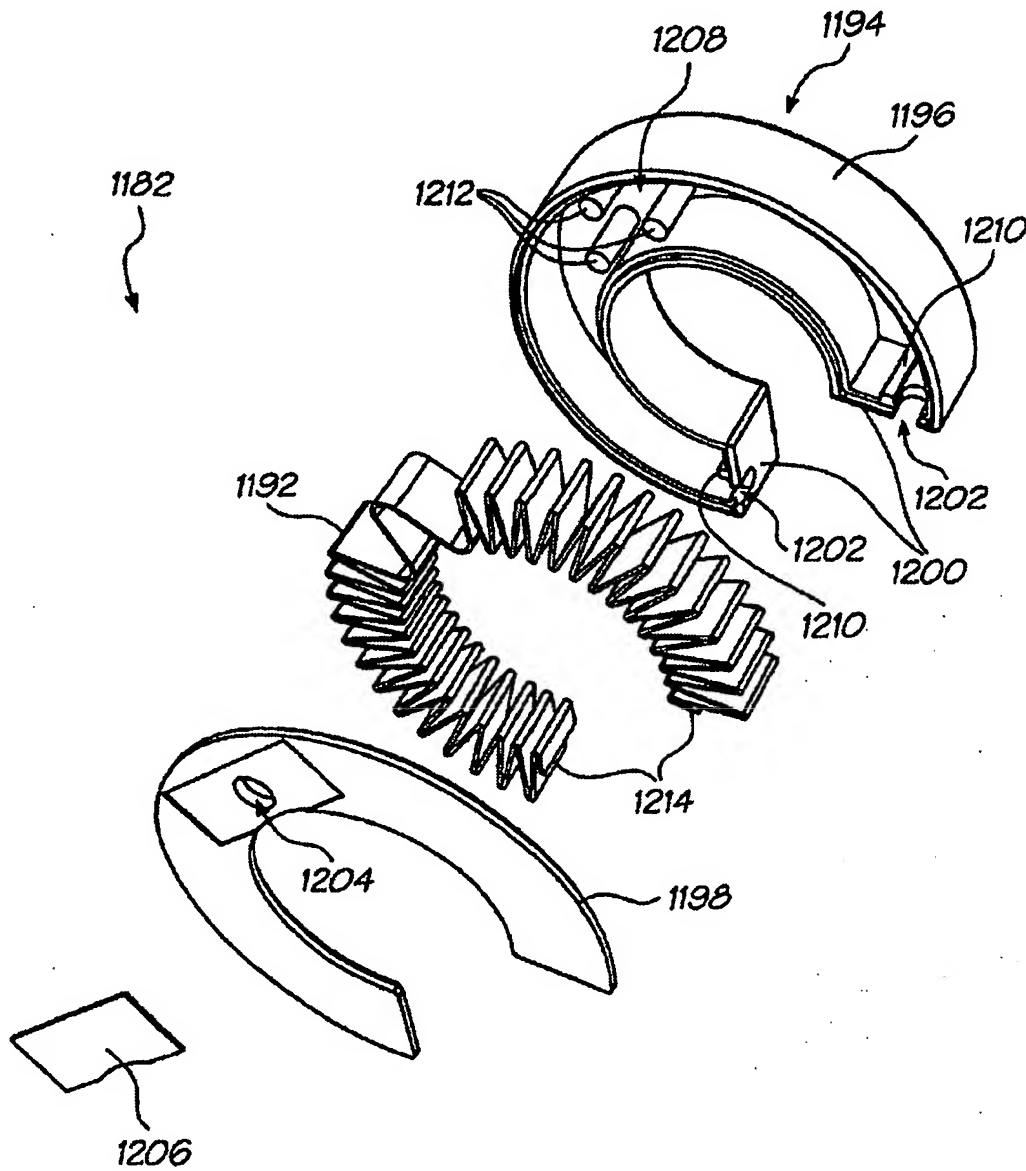


FIG. 164E

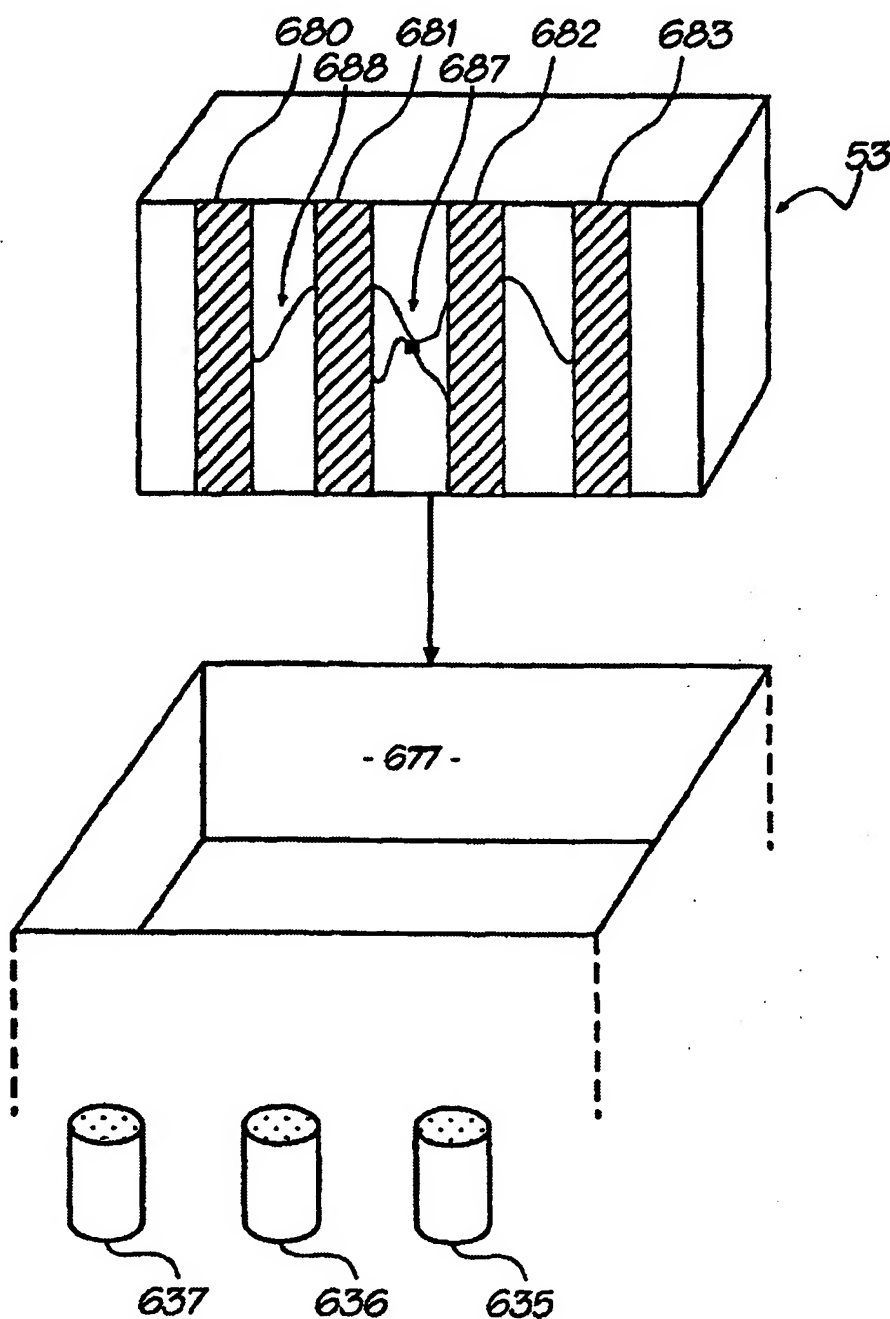


FIG. 165

U.S. Patent

Dec. 25, 2007

Sheet 98 of 149

7,312,845 B2

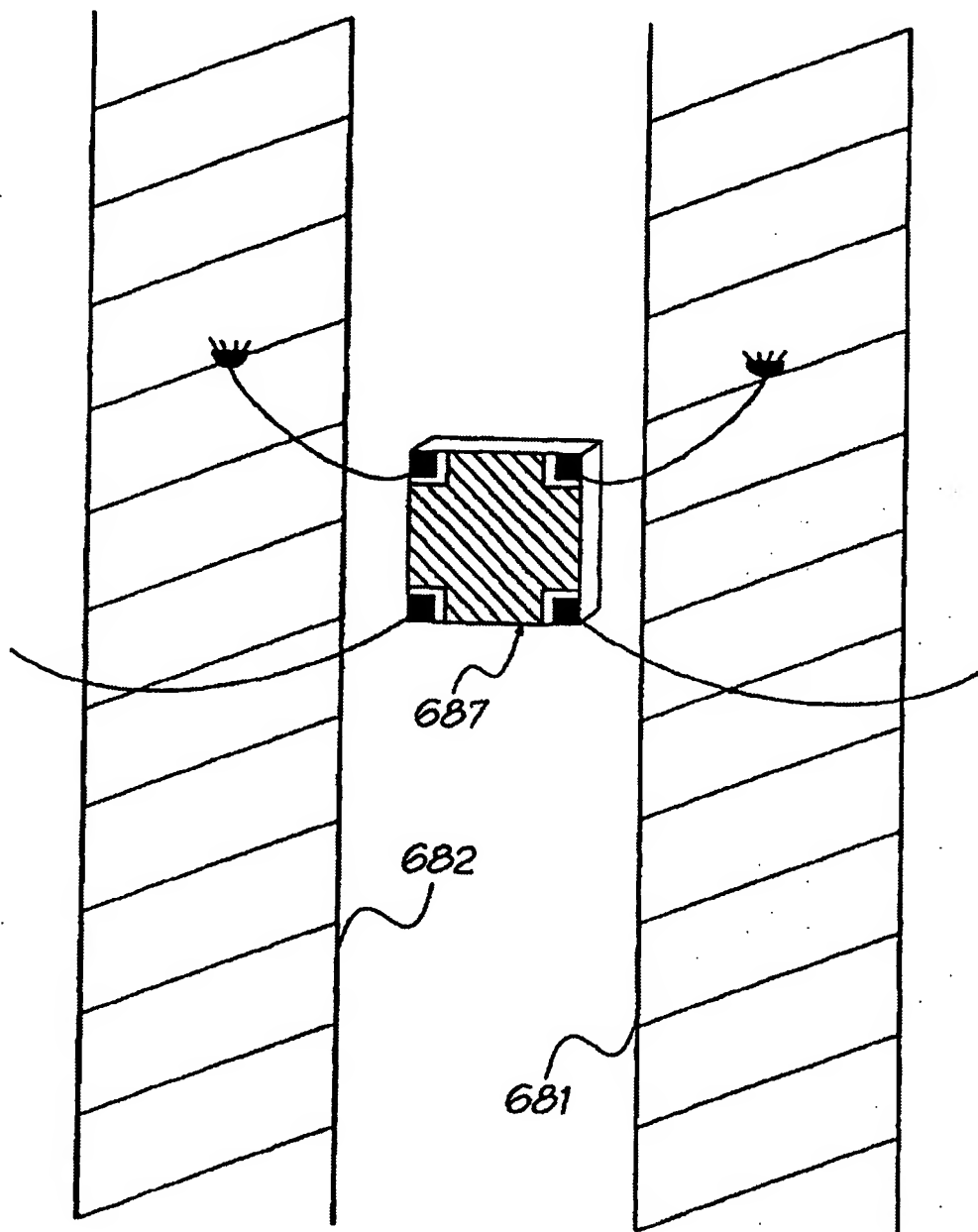


FIG. 166

U.S. Patent

Dec. 25, 2007

Sheet 99 of 149

7,312,845 B2

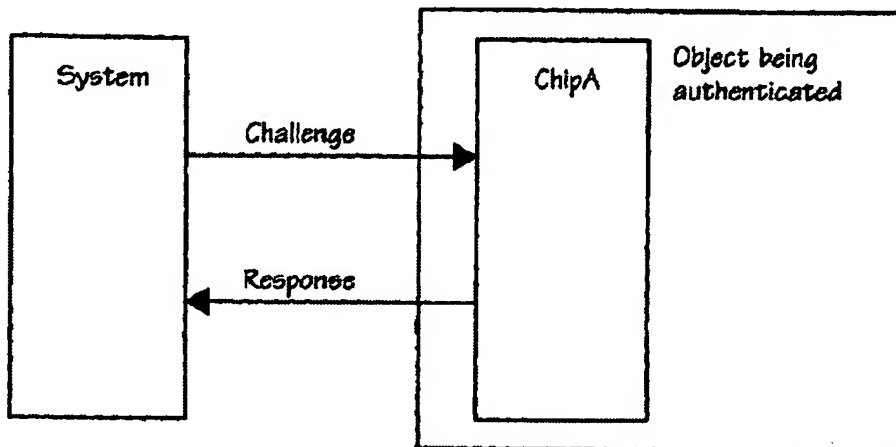


FIG. 167

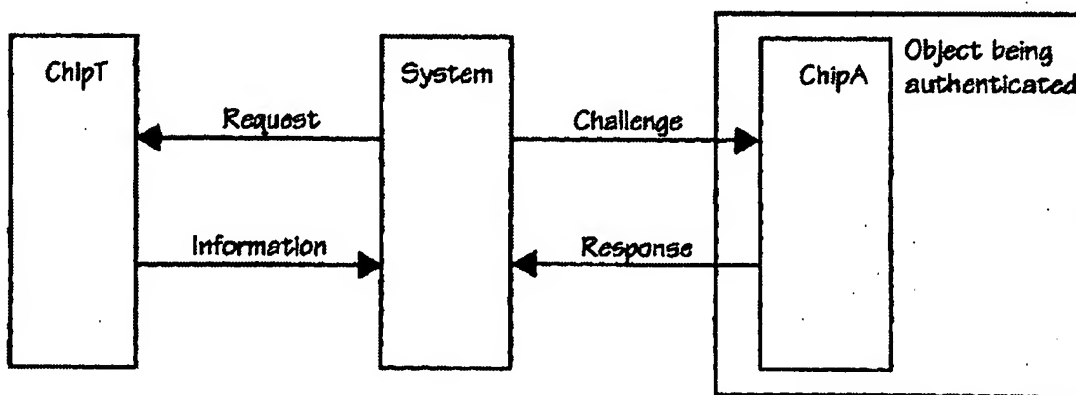


FIG. 168

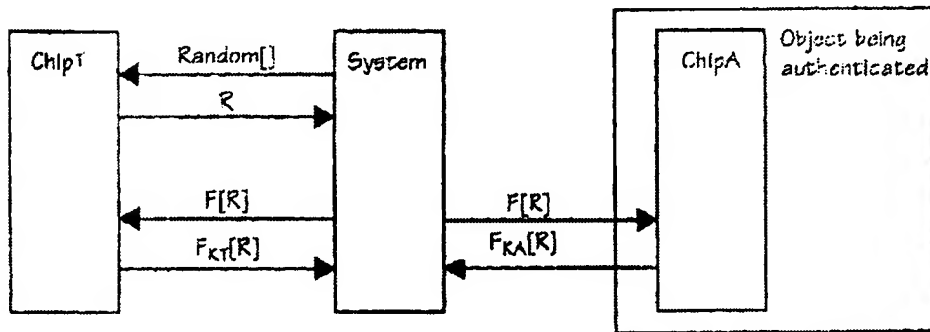


FIG. 169

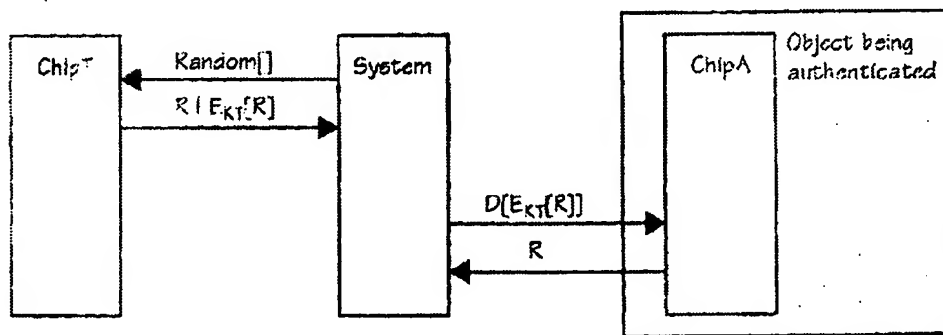


FIG. 170

U.S. Patent

Dec. 25, 2007

Sheet 101 of 149

7,312,845 B2

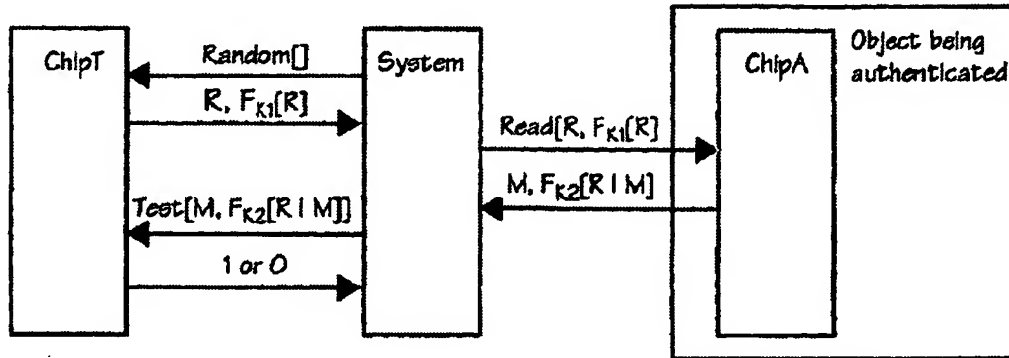


FIG. 171

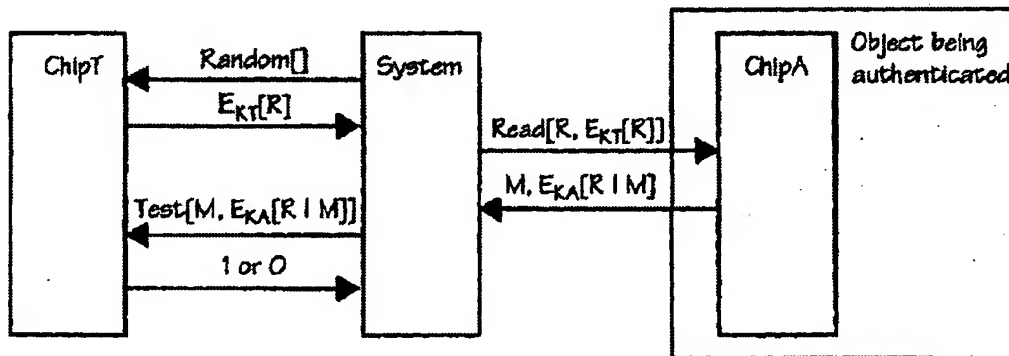


FIG. 172

U.S. Patent

Dec. 25, 2007

Sheet 102 of 149

7,312,845 B2

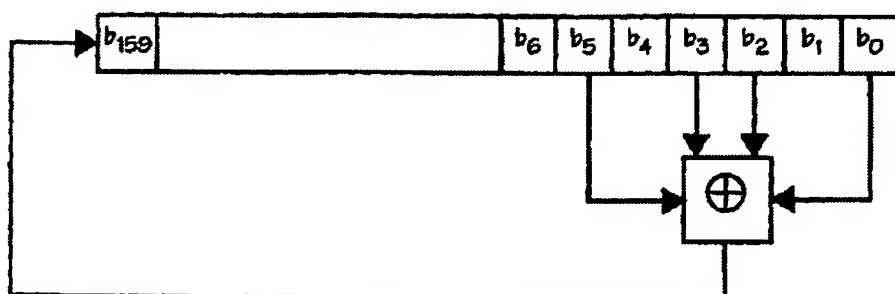


FIG. 173

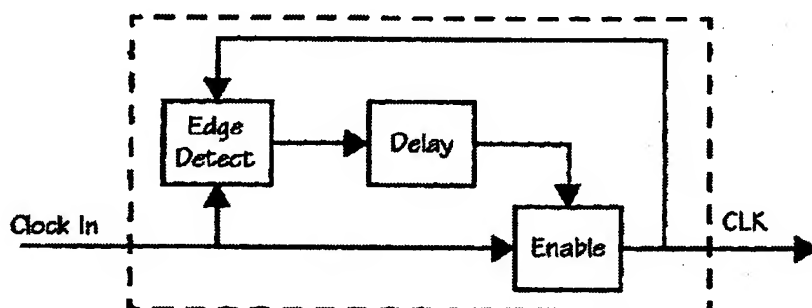


FIG. 174

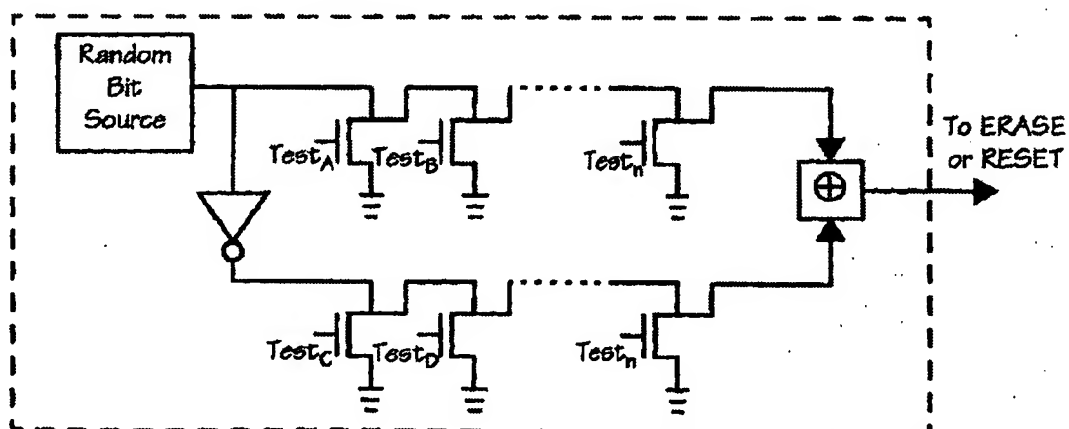


FIG. 175

U.S. Patent

Dec. 25, 2007

Sheet 103 of 149

7,312,845 B2

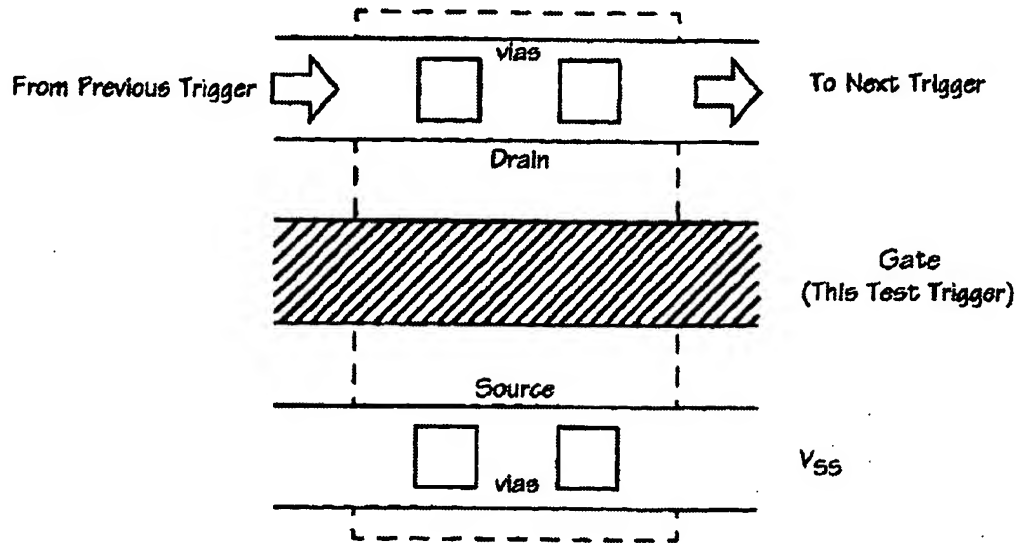


FIG. 176

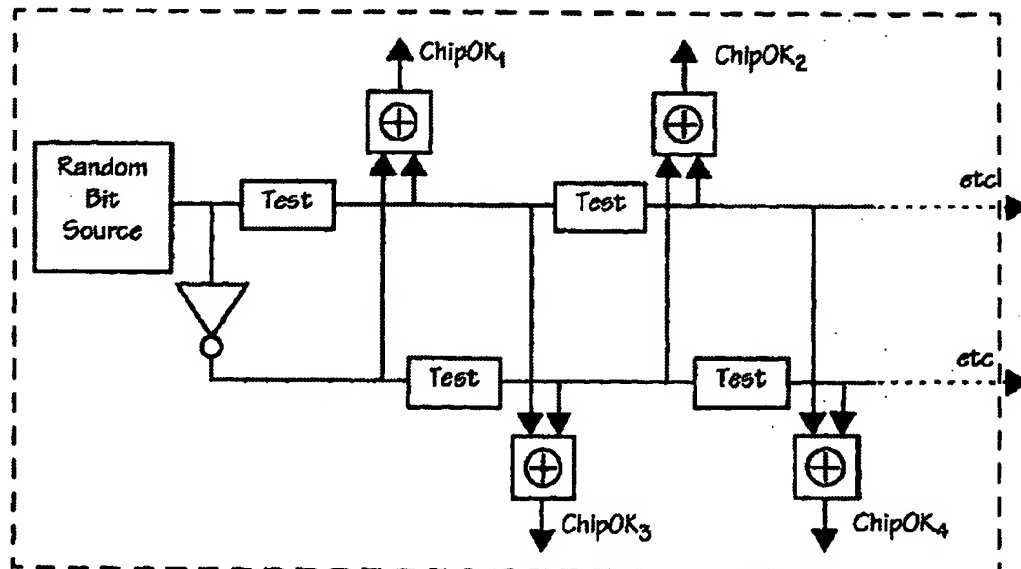


FIG. 177

U.S. Patent

Dec. 25, 2007

Sheet 104 of 149

7,312,845 B2

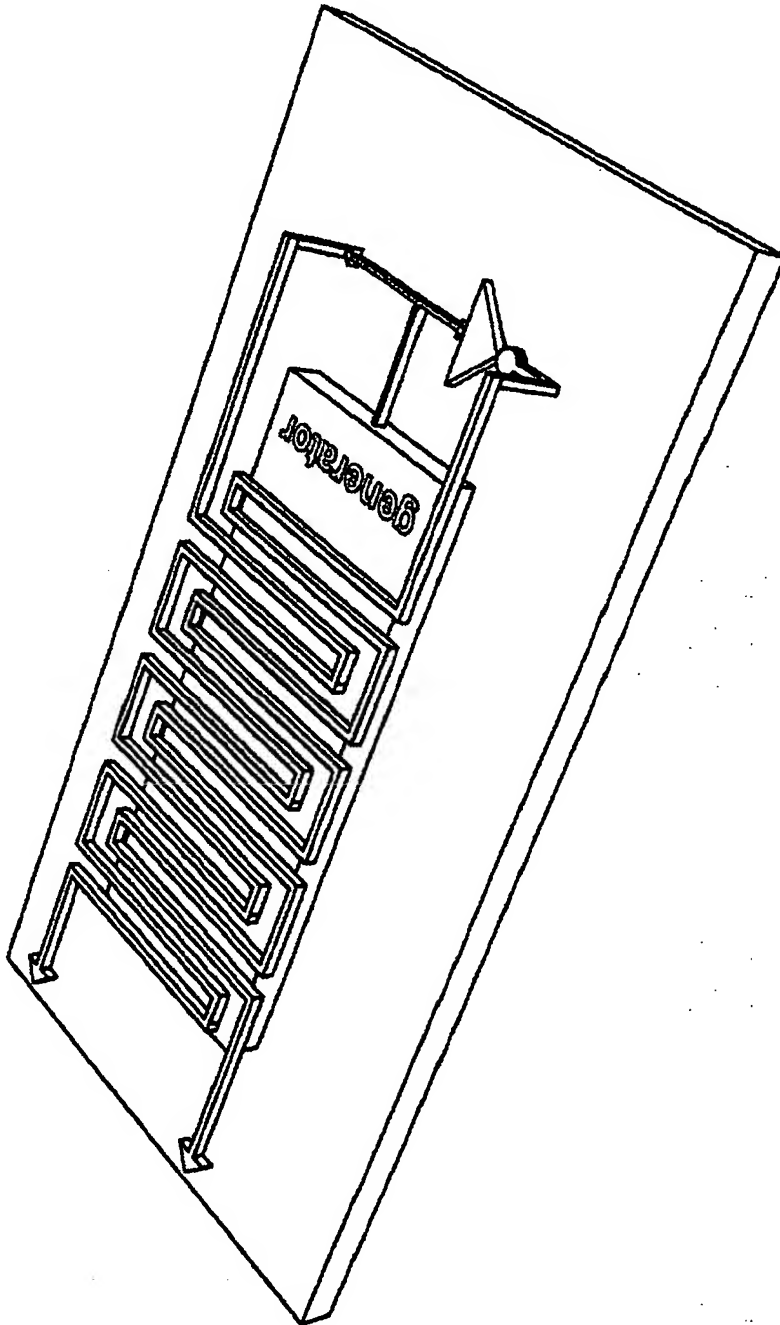


FIG. 178

U.S. Patent

Dec. 25, 2007

Sheet 105 of 149

7,312,845 B2

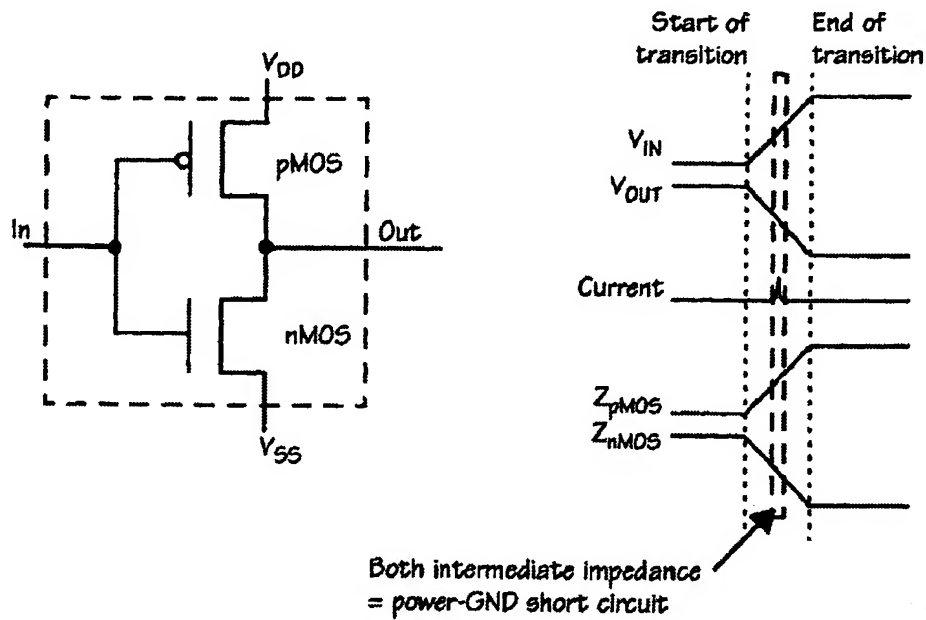


FIG. 179

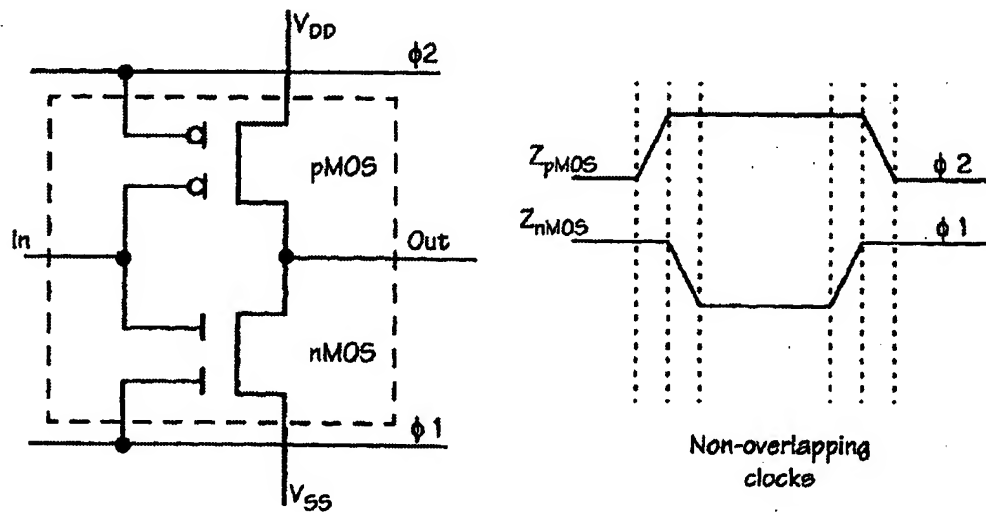


FIG. 180

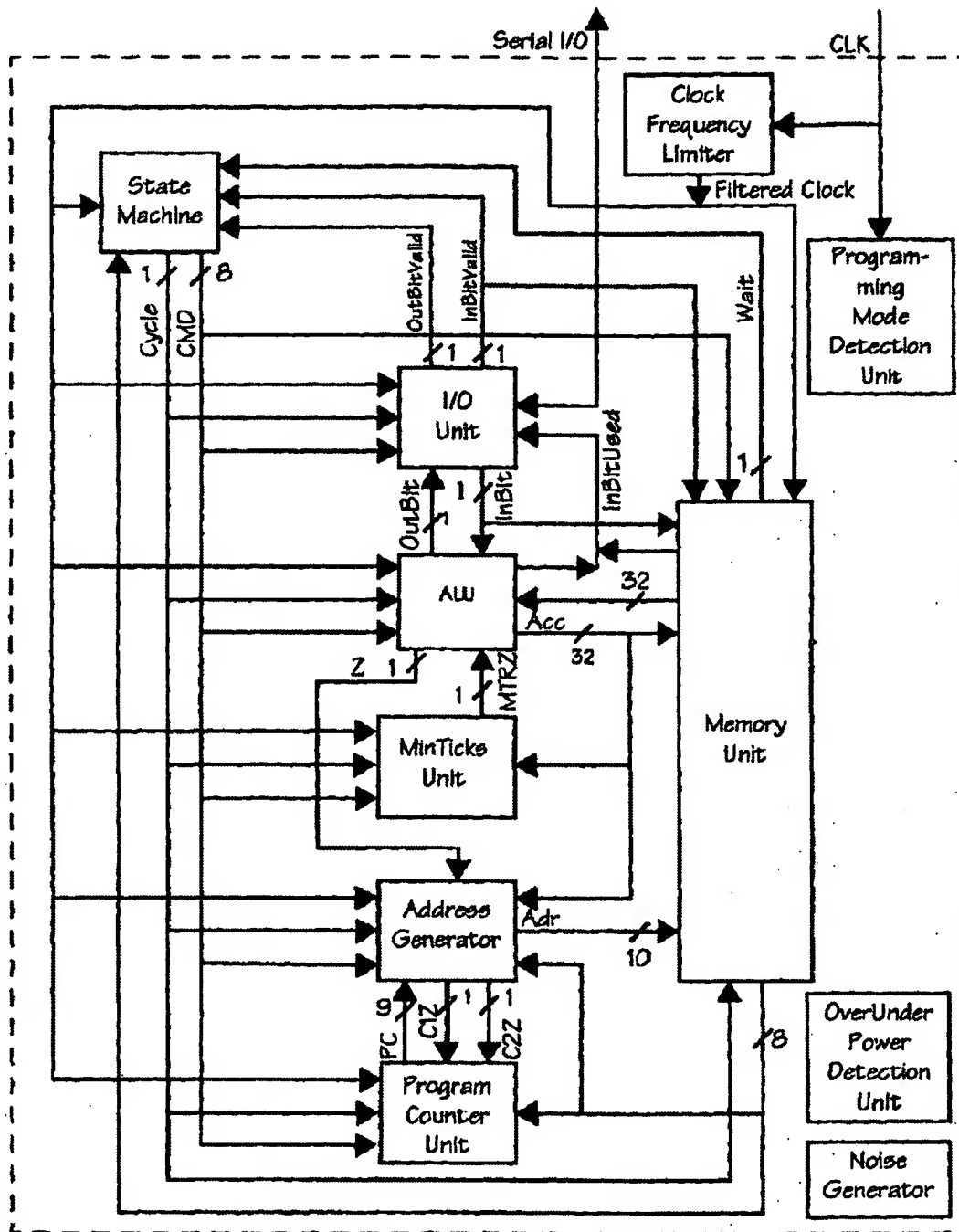


FIG. 181

U.S. Patent

Dec. 25, 2007

Sheet 107 of 149

7,312,845 B2

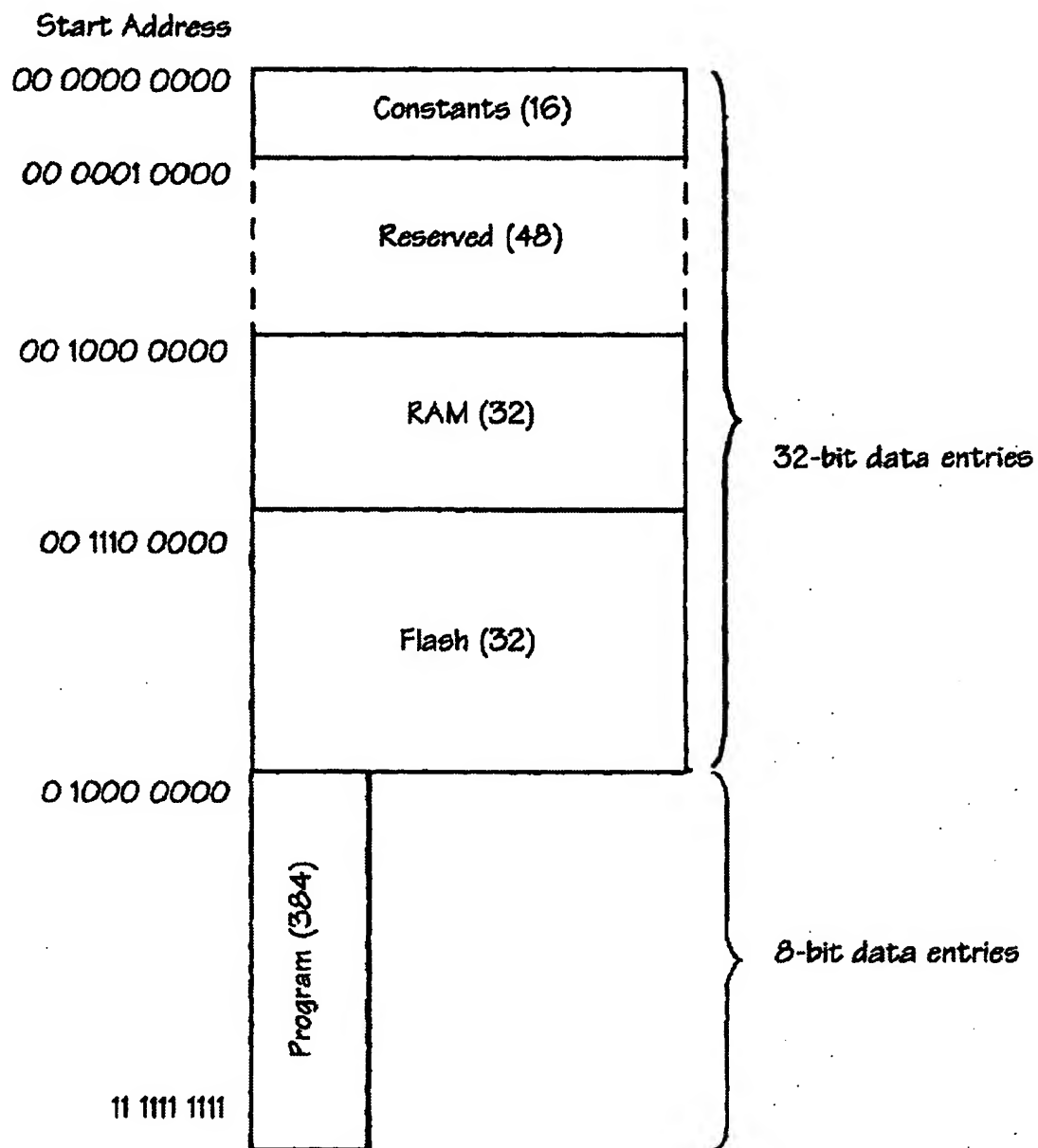


FIG. 182

U.S. Patent

Dec. 25, 2007

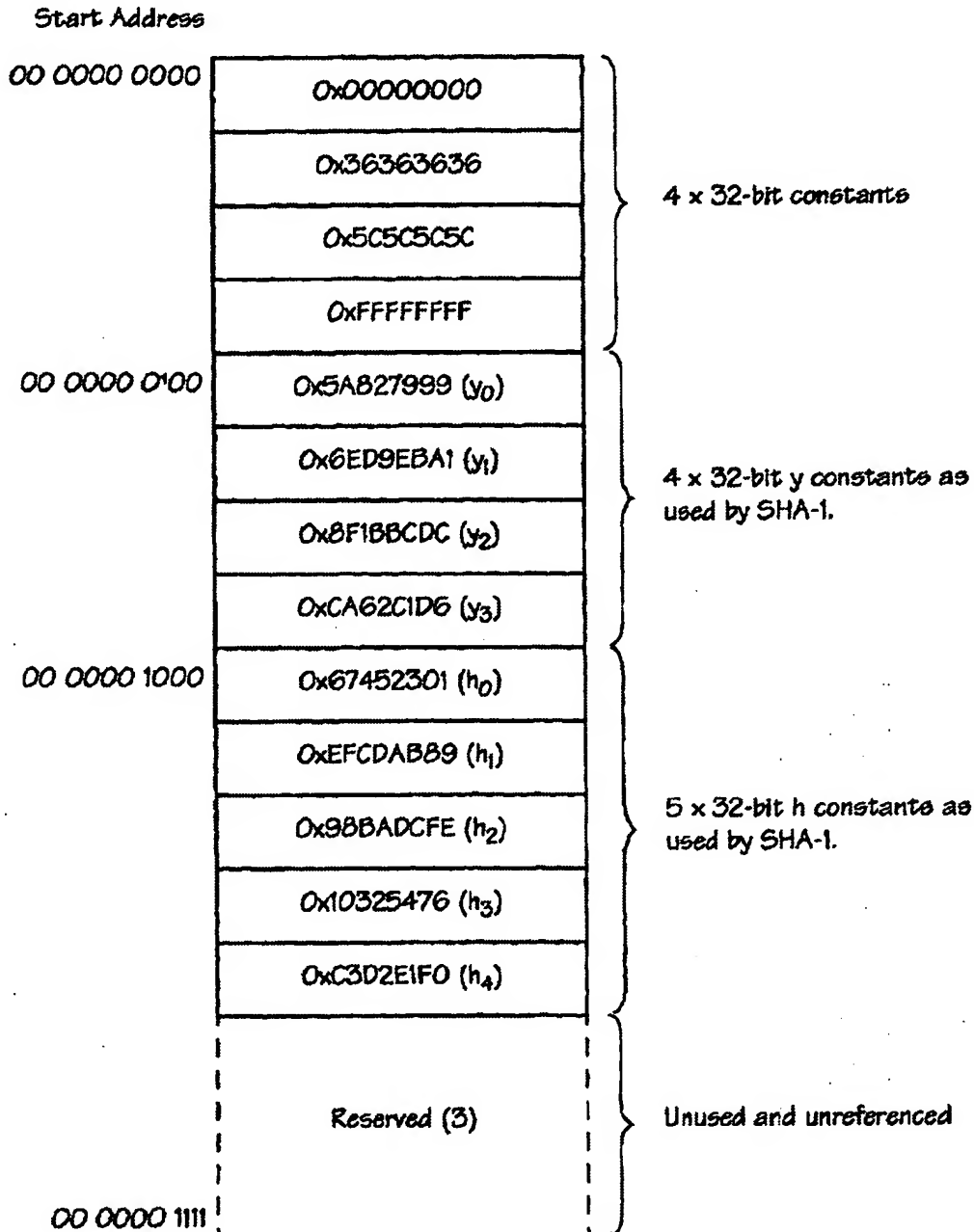
Sheet 108 of 149 **7,312,845 B2**

FIG. 183

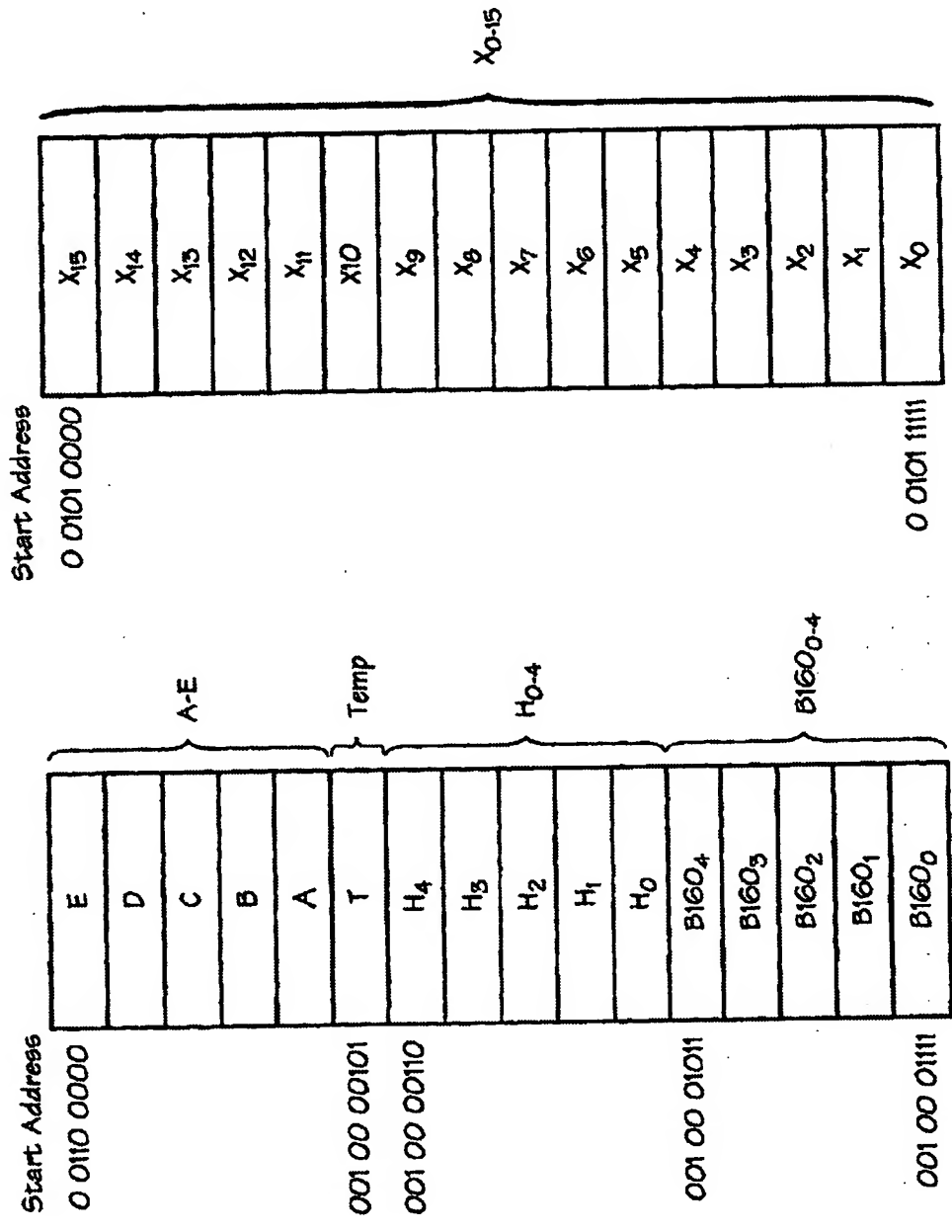


FIG. 184

U.S. Patent

Dec. 25, 2007

Sheet 110 of 149

7,312,845 B2

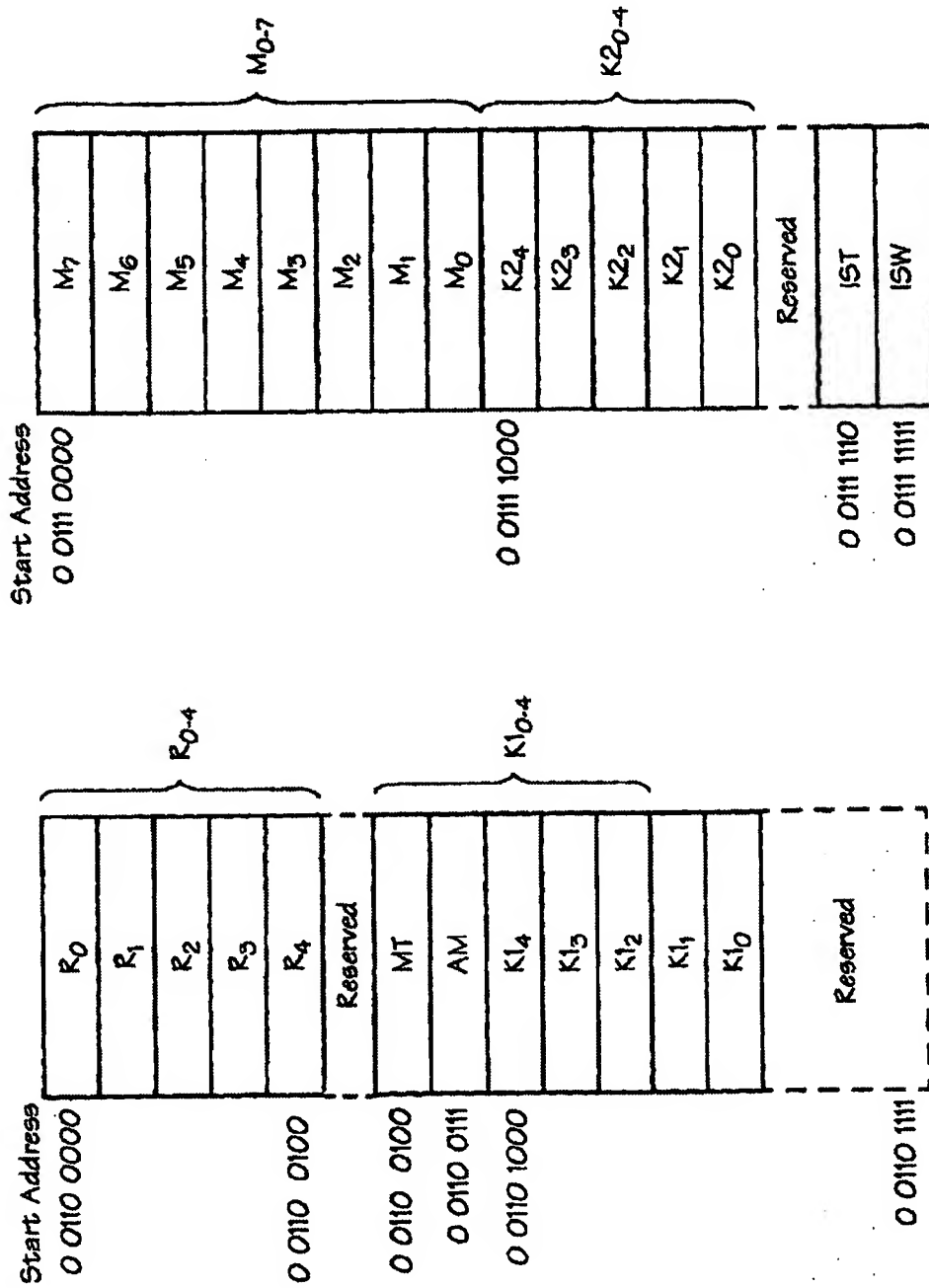


FIG. 185

U.S. Patent

Dec. 25, 2007

Sheet 111 of 149

7,312,845 B2

Start Address

0 1000 0000

Adr Table 1 (32)

0 1010 0000

Adr Table 2 (32)

0 1100 0000

DBR Table (8)

0 1100 1000

Program (312)

11 1111 1111

FIG. 186

U.S. Patent

Dec. 25, 2007

Sheet 112 of 149

7,312,845 B2

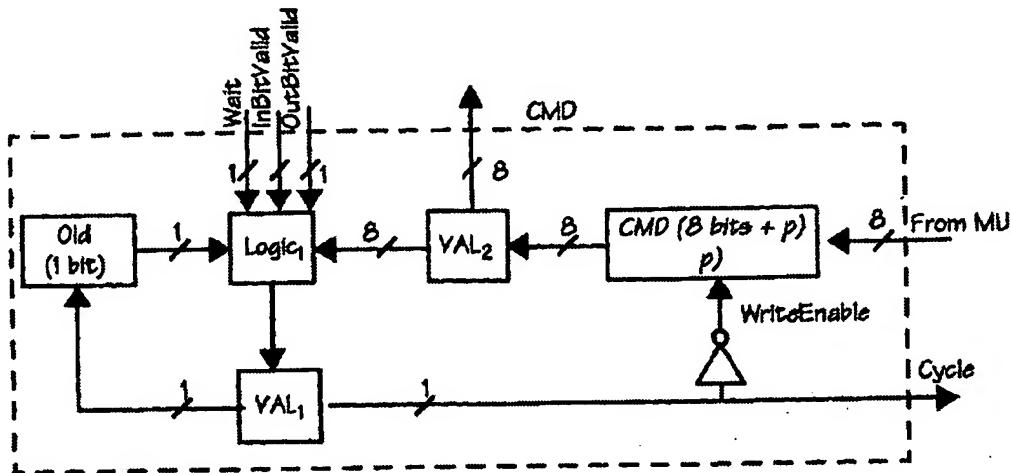


FIG. 187

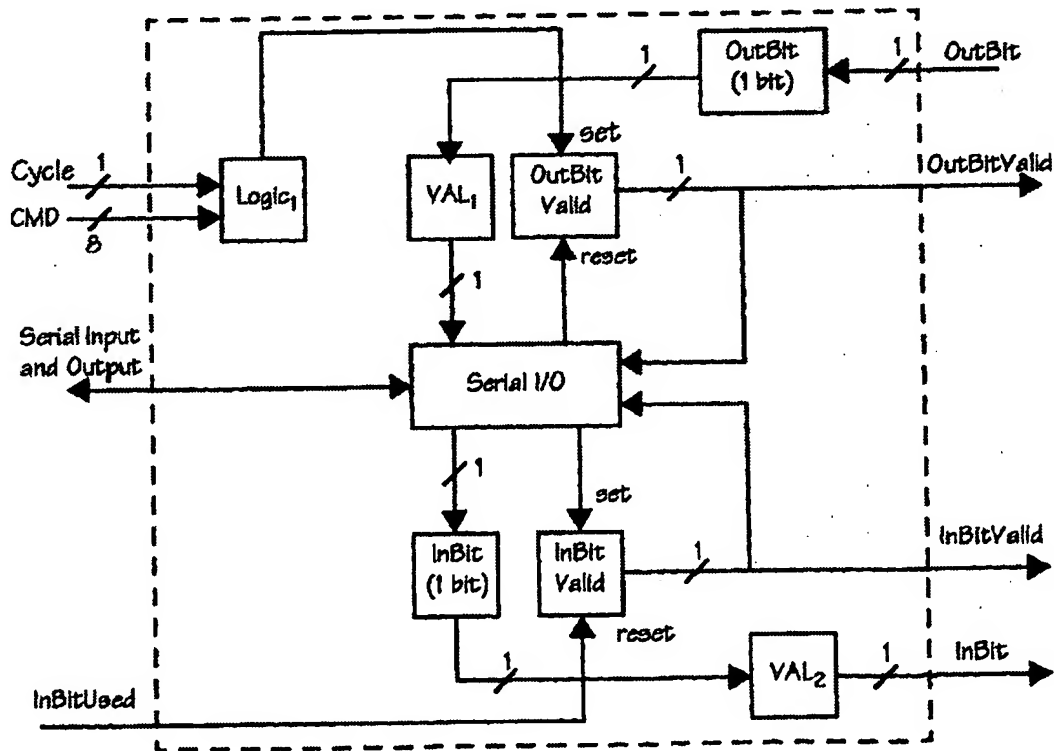


FIG. 188

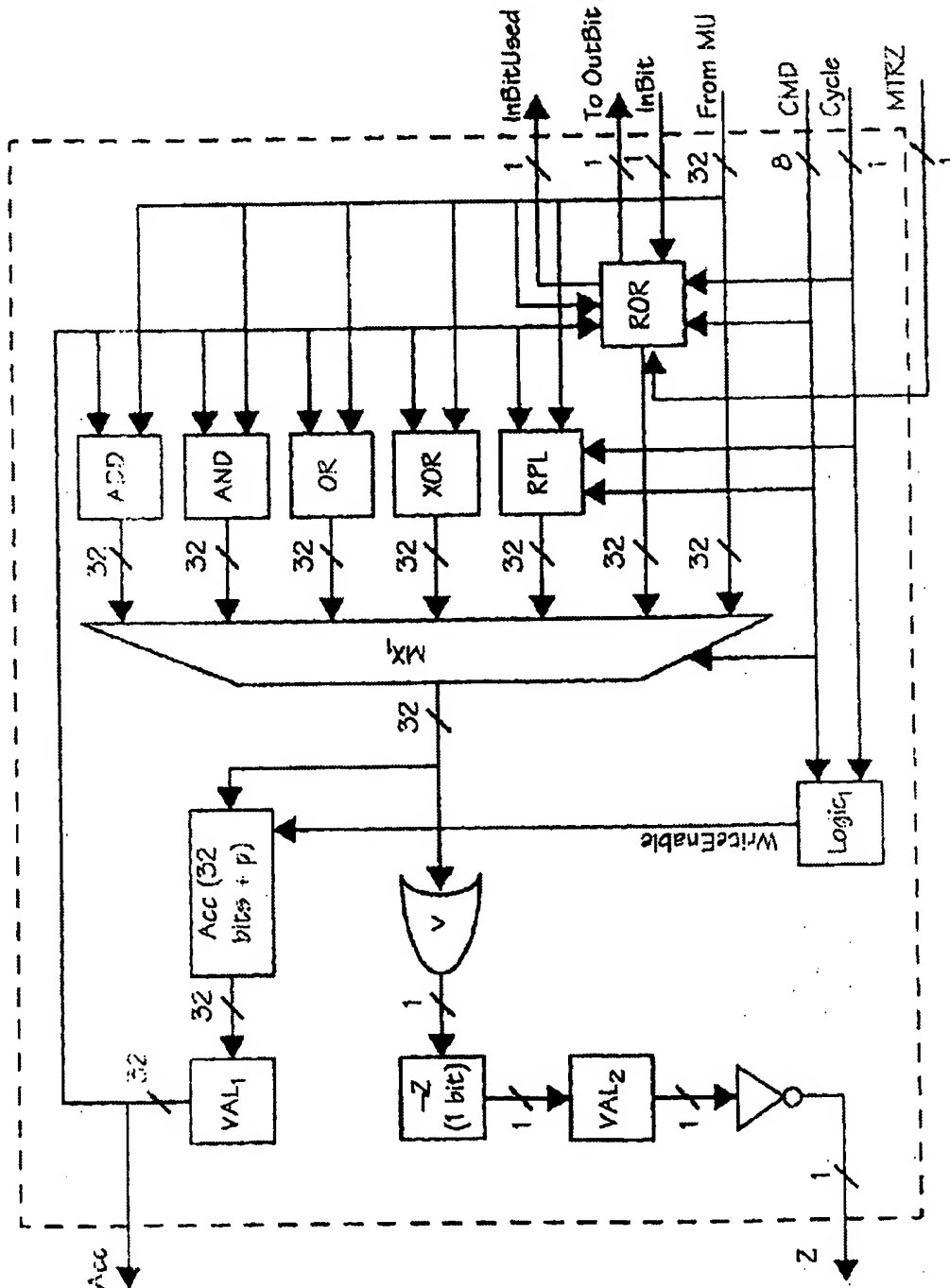


FIG. 189

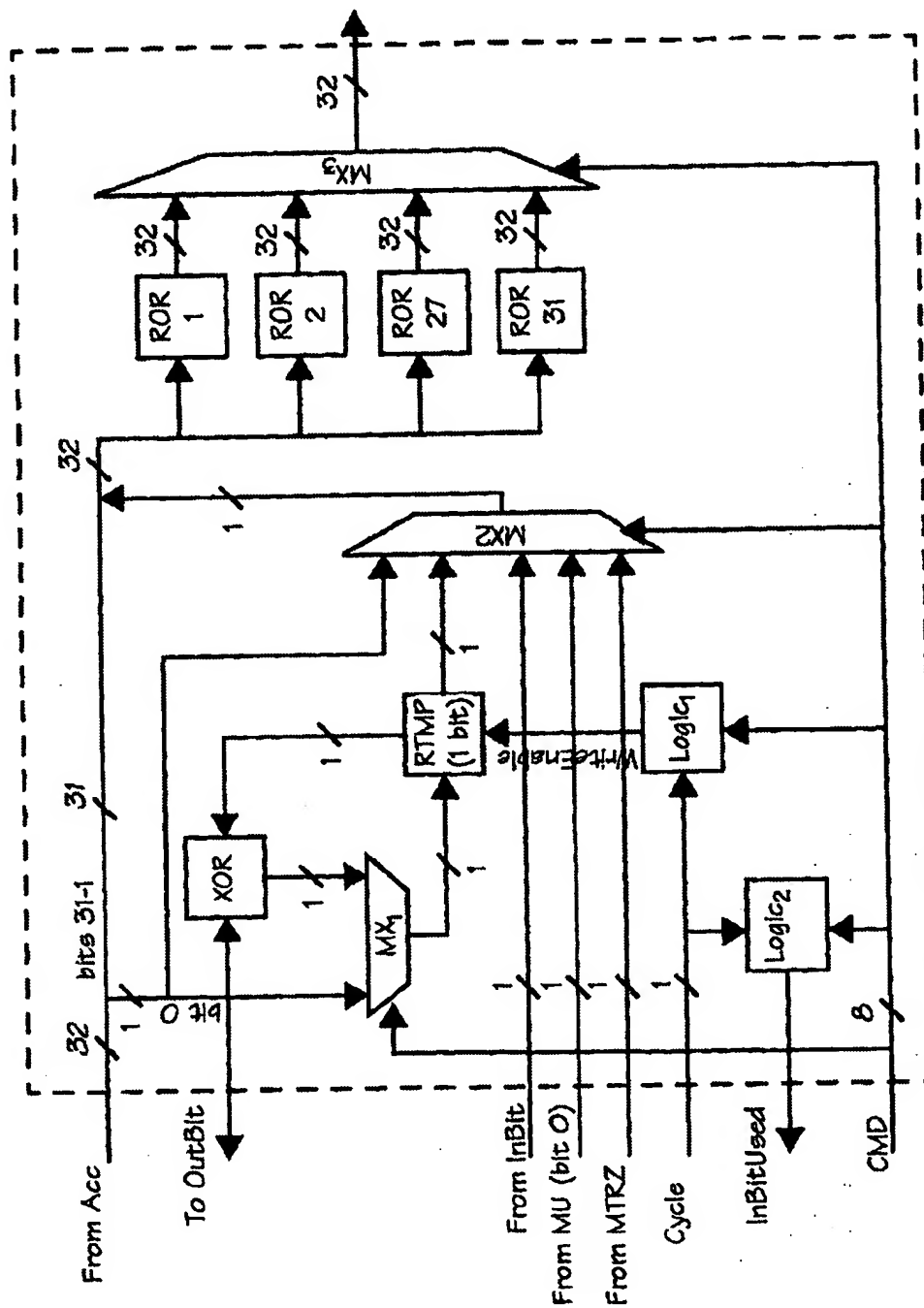


FIG. 190



FIG. 191

U.S. Patent

Dec. 25, 2007

Sheet 116 of 149

7,312,845 B2

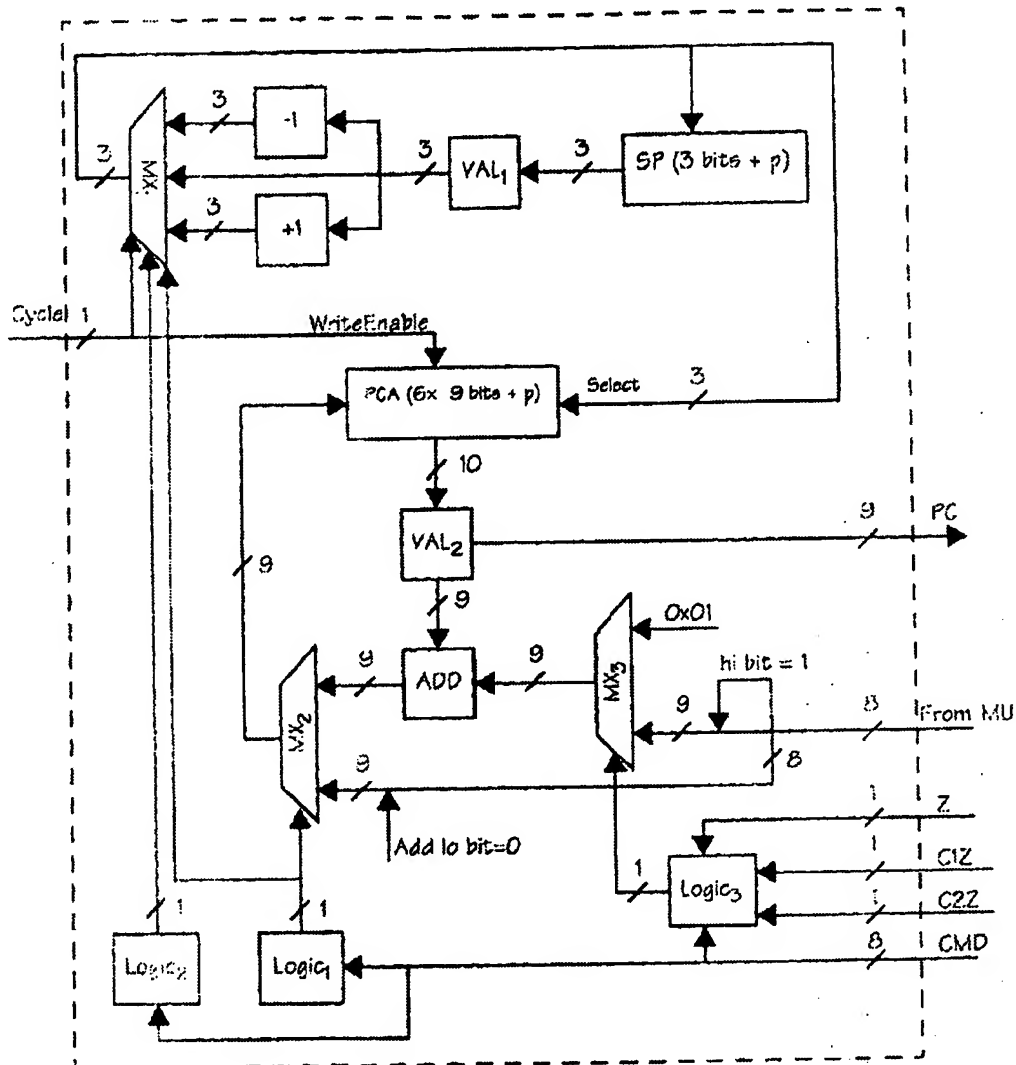


FIG. 192

U.S. Patent

Dec. 25, 2007

Sheet 117 of 149

7,312,845 B2

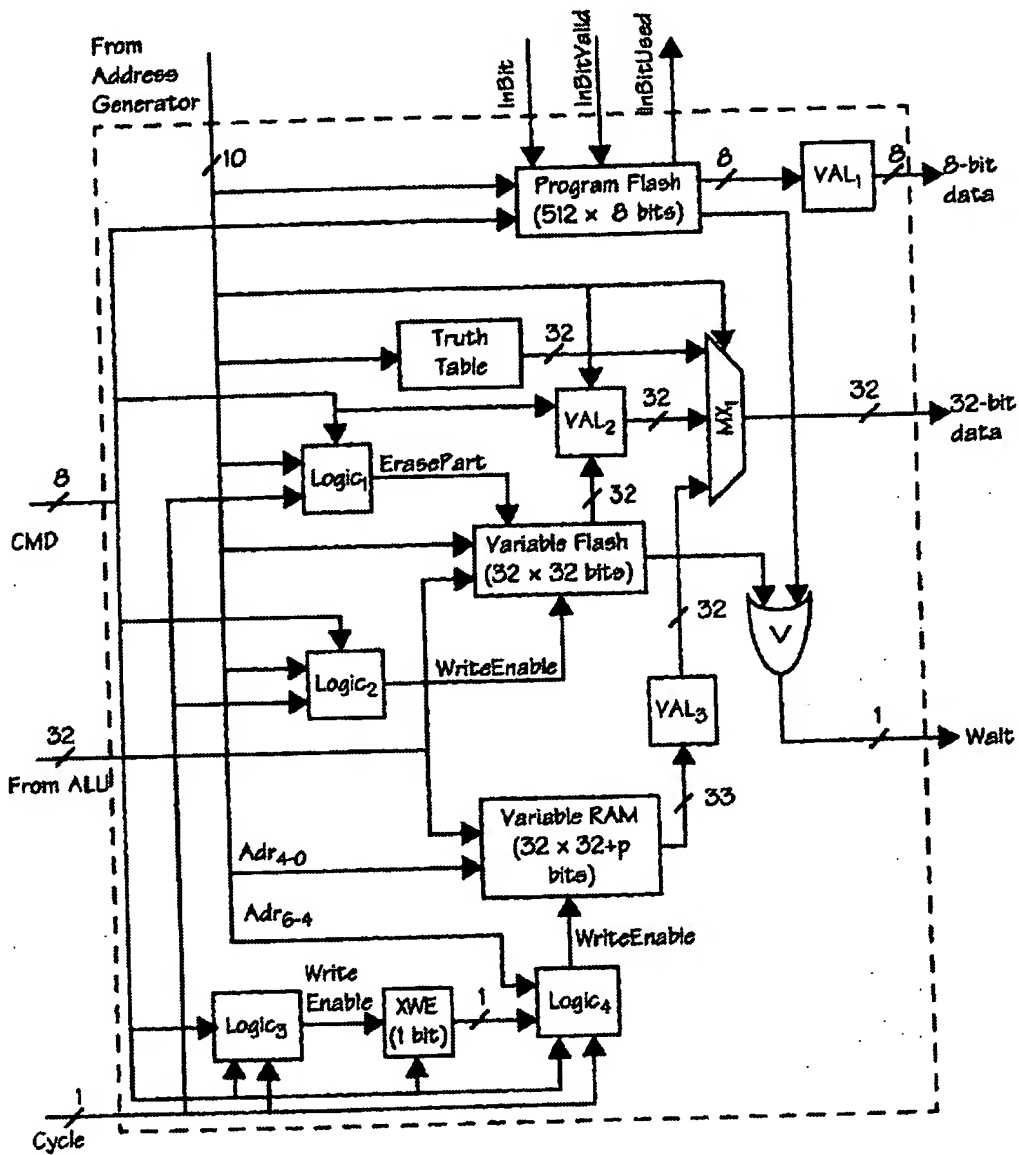


FIG. 193

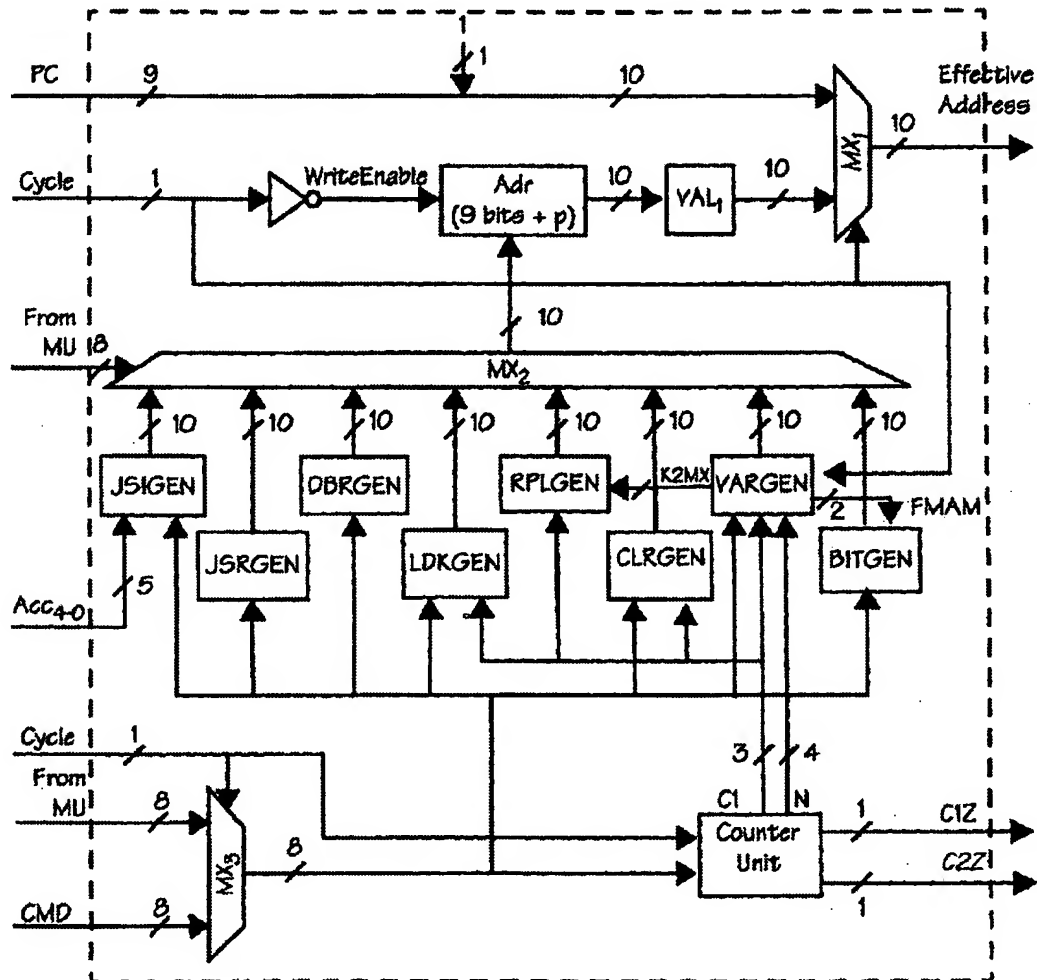


FIG. 194

U.S. Patent

Dec. 25, 2007

Sheet 119 of 149

7,312,845 B2

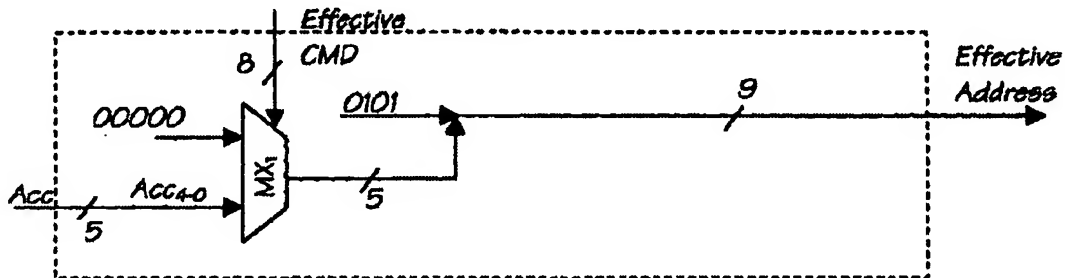


FIG. 195

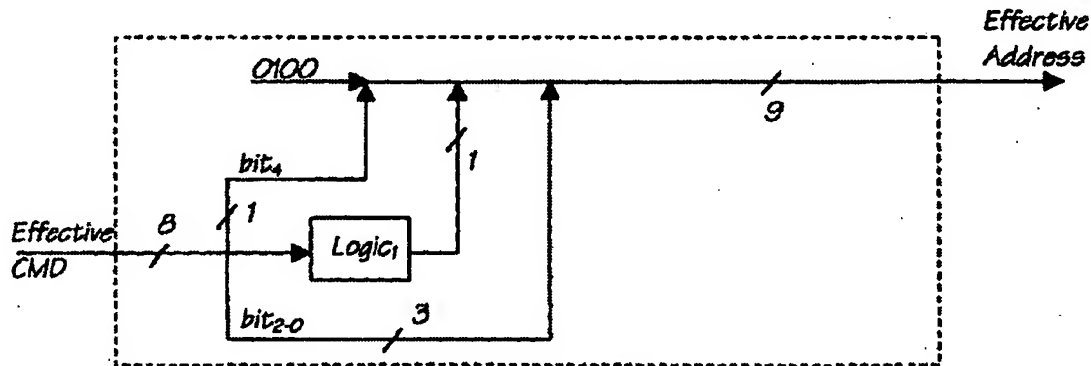


FIG. 196

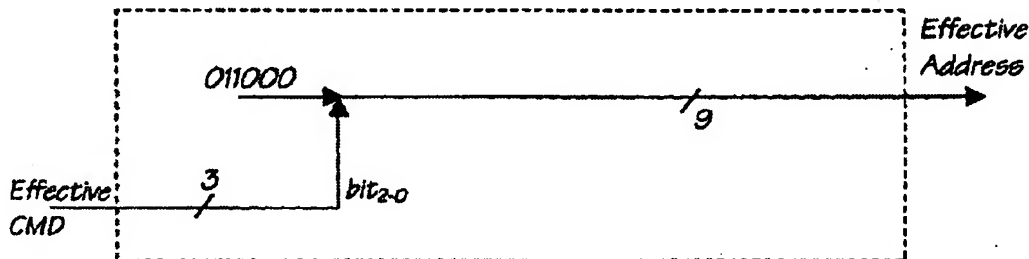


FIG. 197

U.S. Patent

Dec. 25, 2007

Sheet 120 of 149

7,312,845 B2

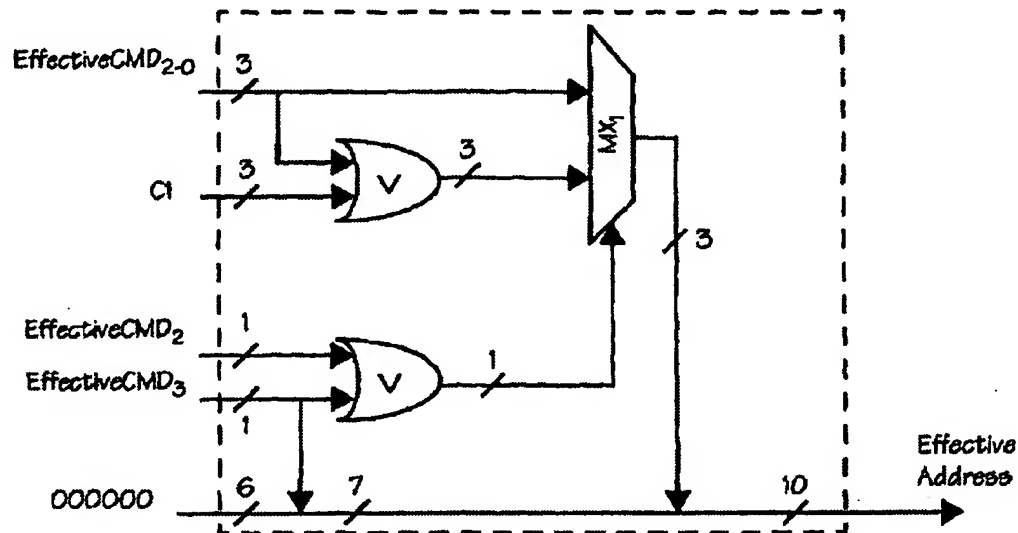


FIG. 198

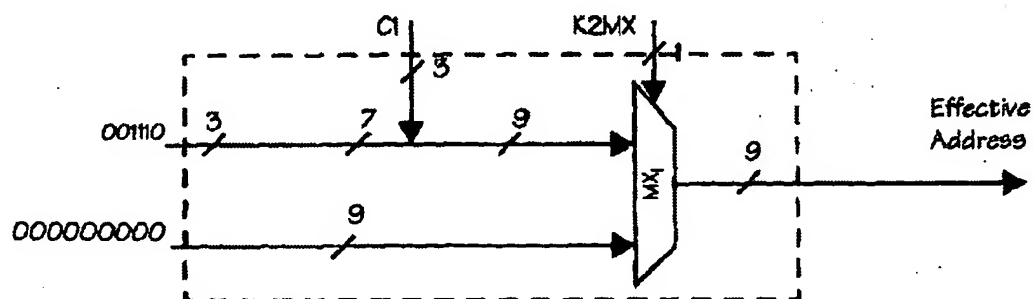


FIG. 199

U.S. Patent

Dec. 25, 2007

Sheet 121 of 149

7,312,845 B2

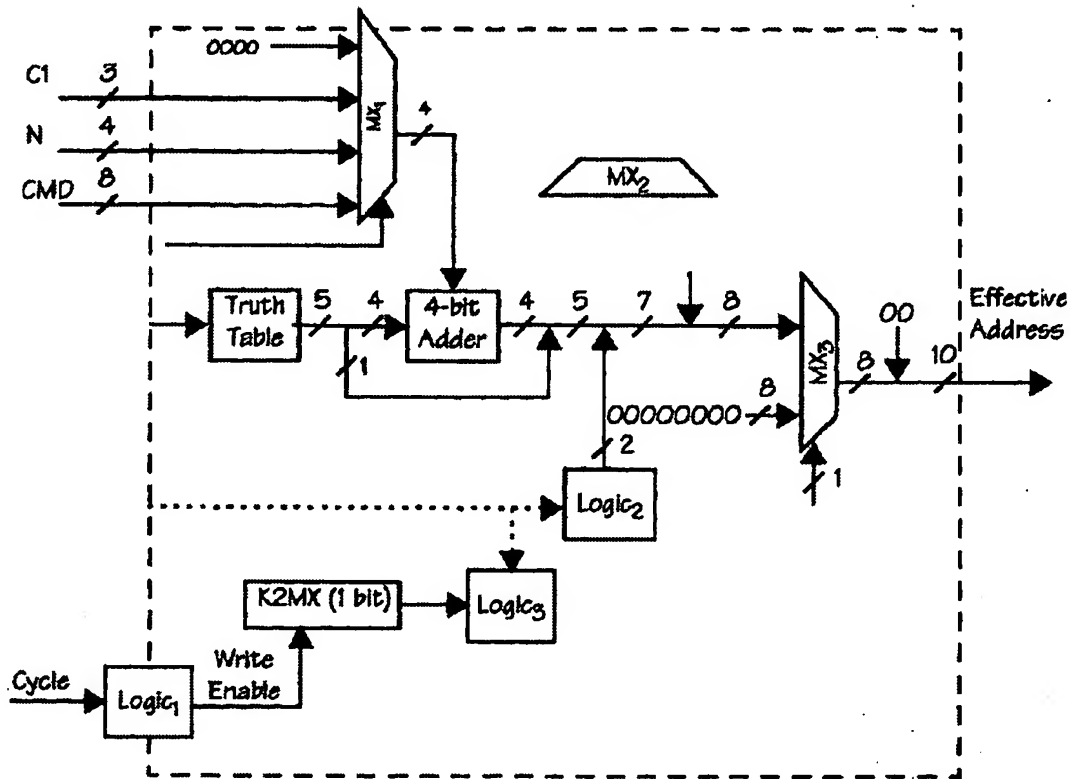


FIG. 200

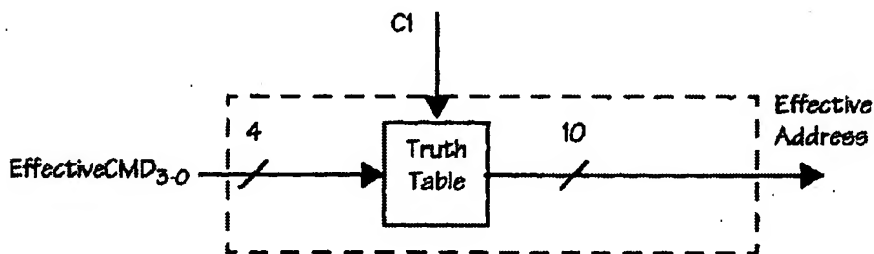


FIG. 201

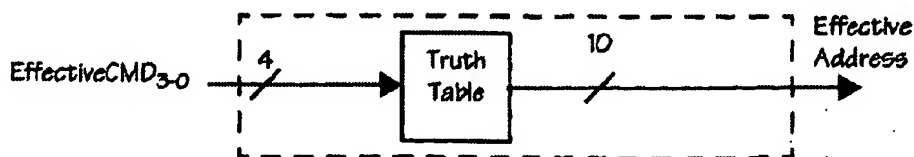


FIG. 202

U.S. Patent

Dec. 25, 2007

Sheet 122 of 149

7,312,845 B2

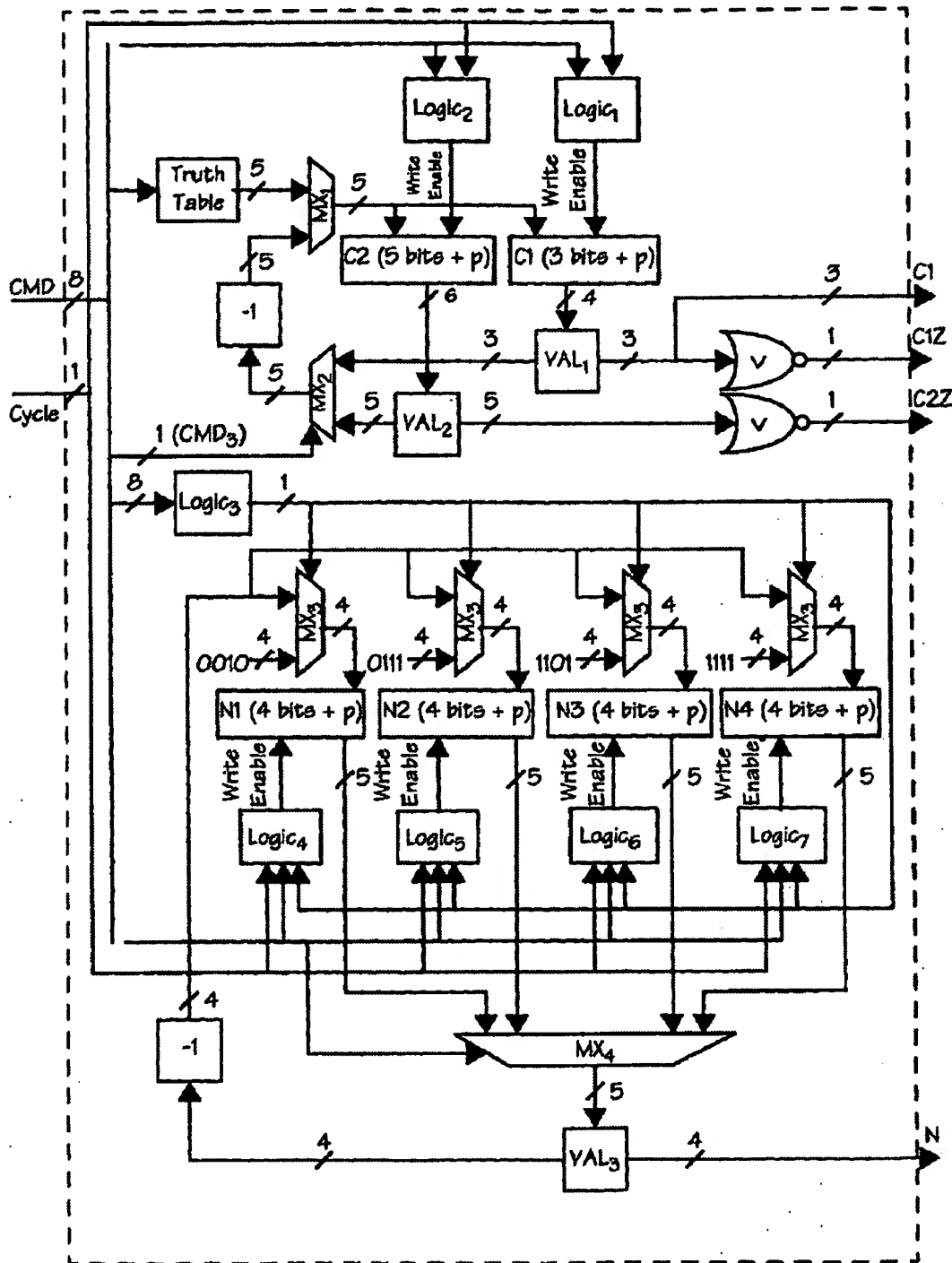


FIG. 203


U.S. Patent

Dec. 25, 2007


Sheet 123 of 149

7,312,845 B2

705



DATA TYPE	BITS
Factory Code	16
Batch Number	32
Serial Number	48
Manufacturing Date	16
Media Length	24
Media Type	8
Preprinted Media Length	16
Cyan Ink Viscosity	8
Magenta Ink Viscosity	8
Yellow Ink Viscosity	8
Cyan Drop Volume	8
Magenta Drop Volume	8
Yellow Drop Volume	8
Cyan Ink Color	24
Magenta Ink Color	24
Yellow Ink Color	24
Remaining-media Length Indicator	16
Authentication Key	128
Copyrightable bit pattern	512
Reserved for Camera Use	88
TOTAL	1024



728

FIG. 204

U.S. Patent

Dec. 25, 2007

Sheet 124 of 149

7,312,845 B2

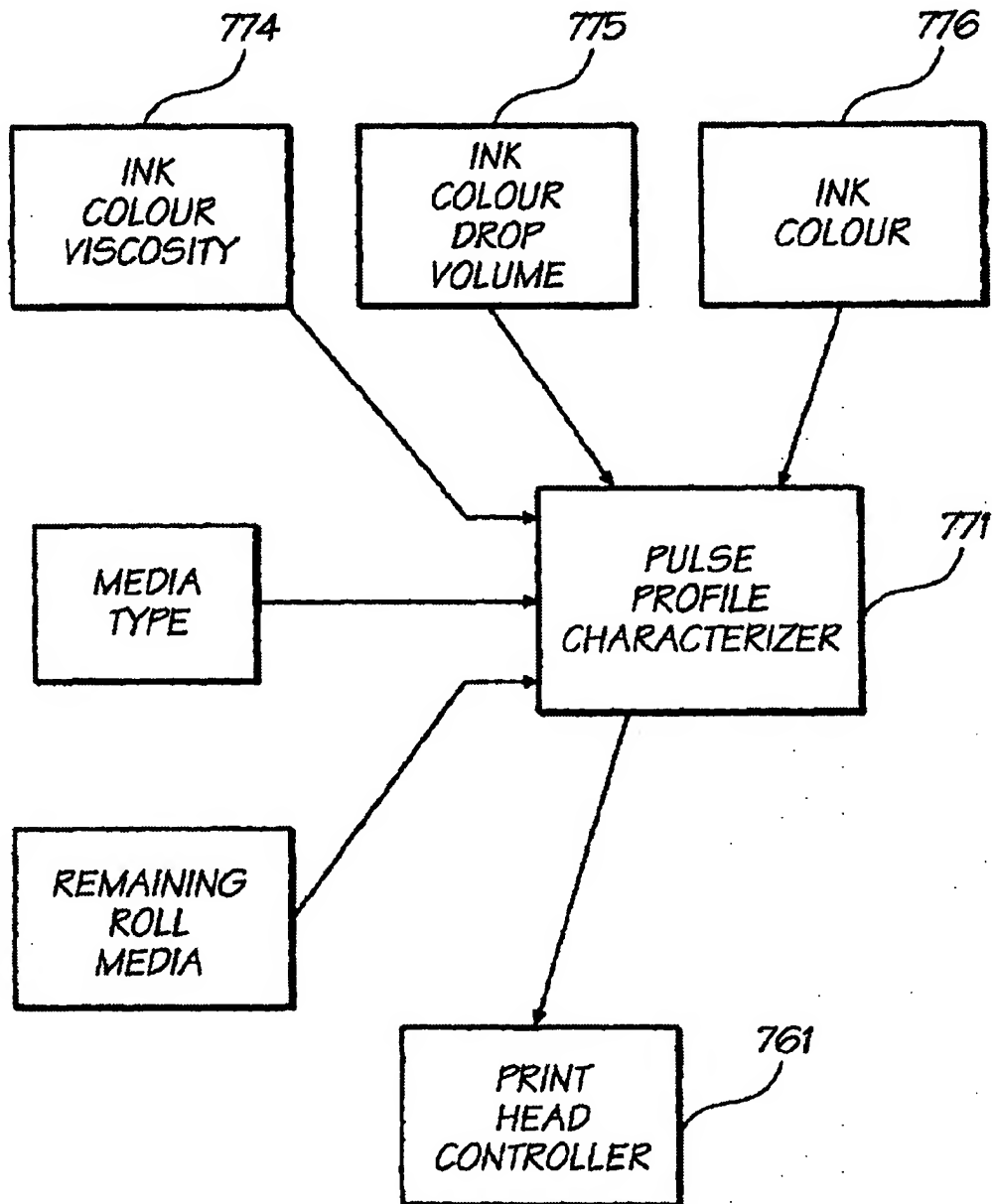


FIG. 205

U.S. Patent

Dec. 25, 2007

Sheet 125 of 149

7,312,845 B2

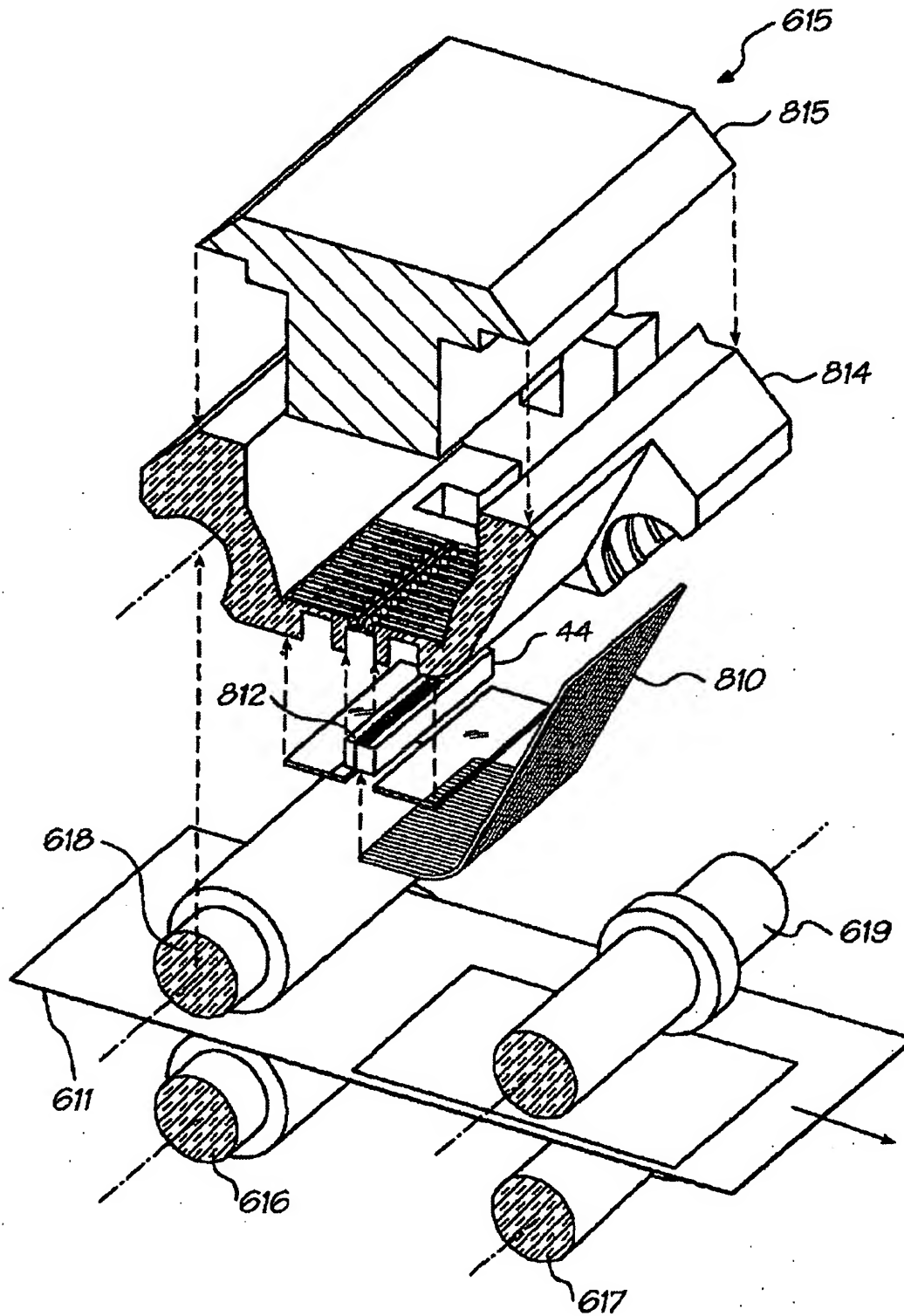


FIG. 206

U.S. Patent

Dec. 25, 2007

Sheet 126 of 149

7,312,845 B2

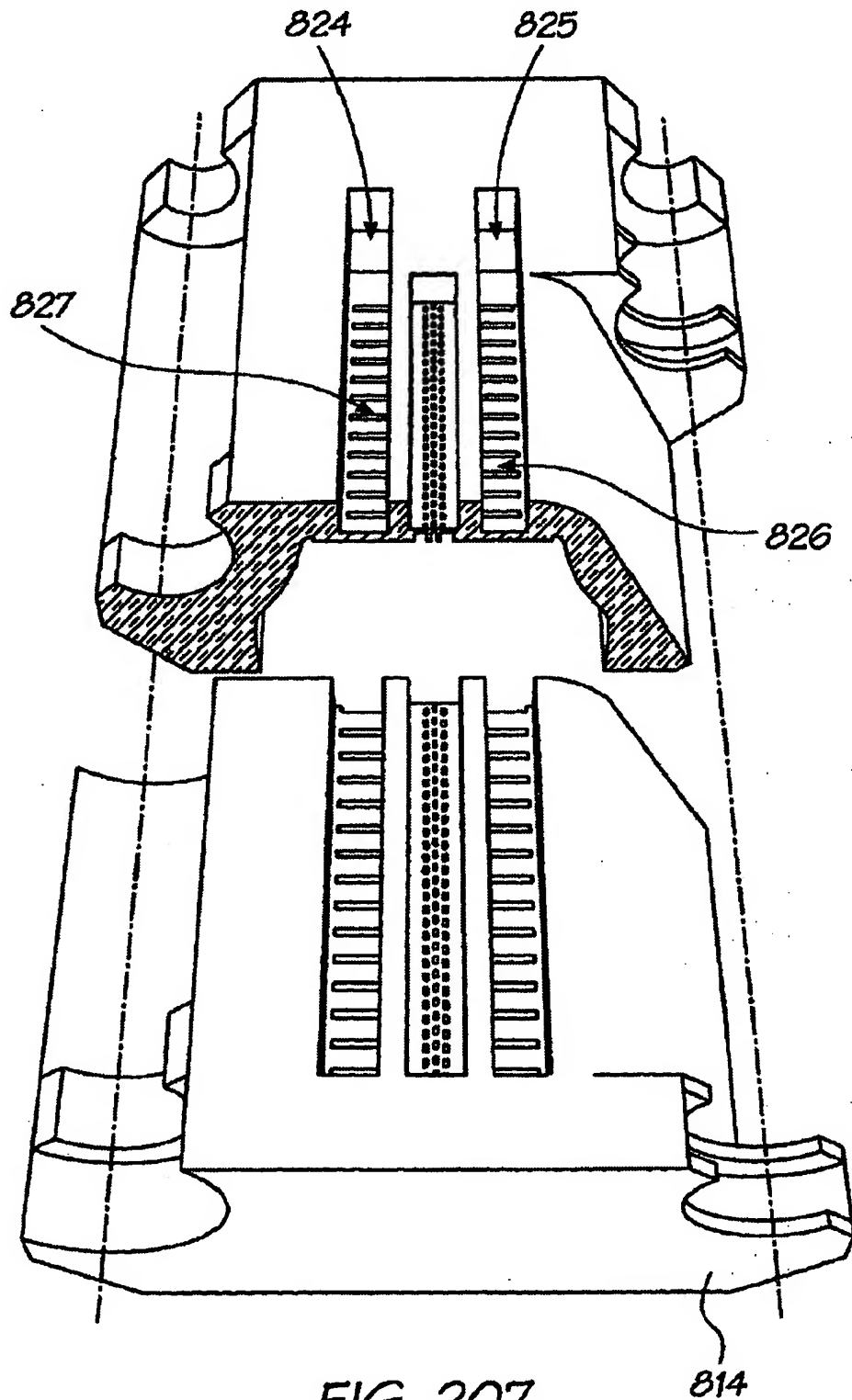


FIG. 207

U.S. Patent

Dec. 25, 2007

Sheet 127 of 149

7,312,845 B2

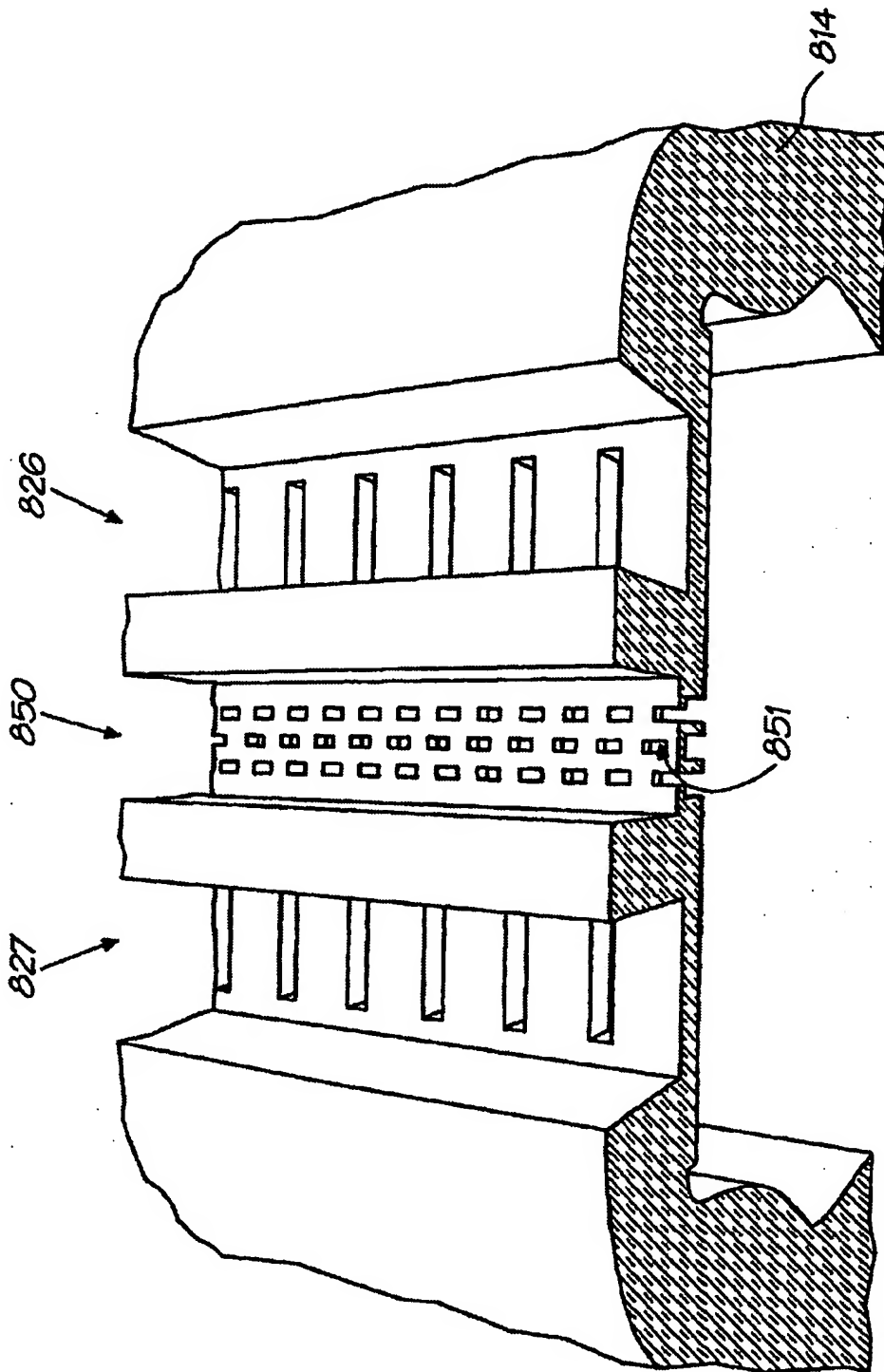


FIG. 208

U.S. Patent

Dec. 25, 2007

Sheet 128 of 149 **7,312,845 B2**

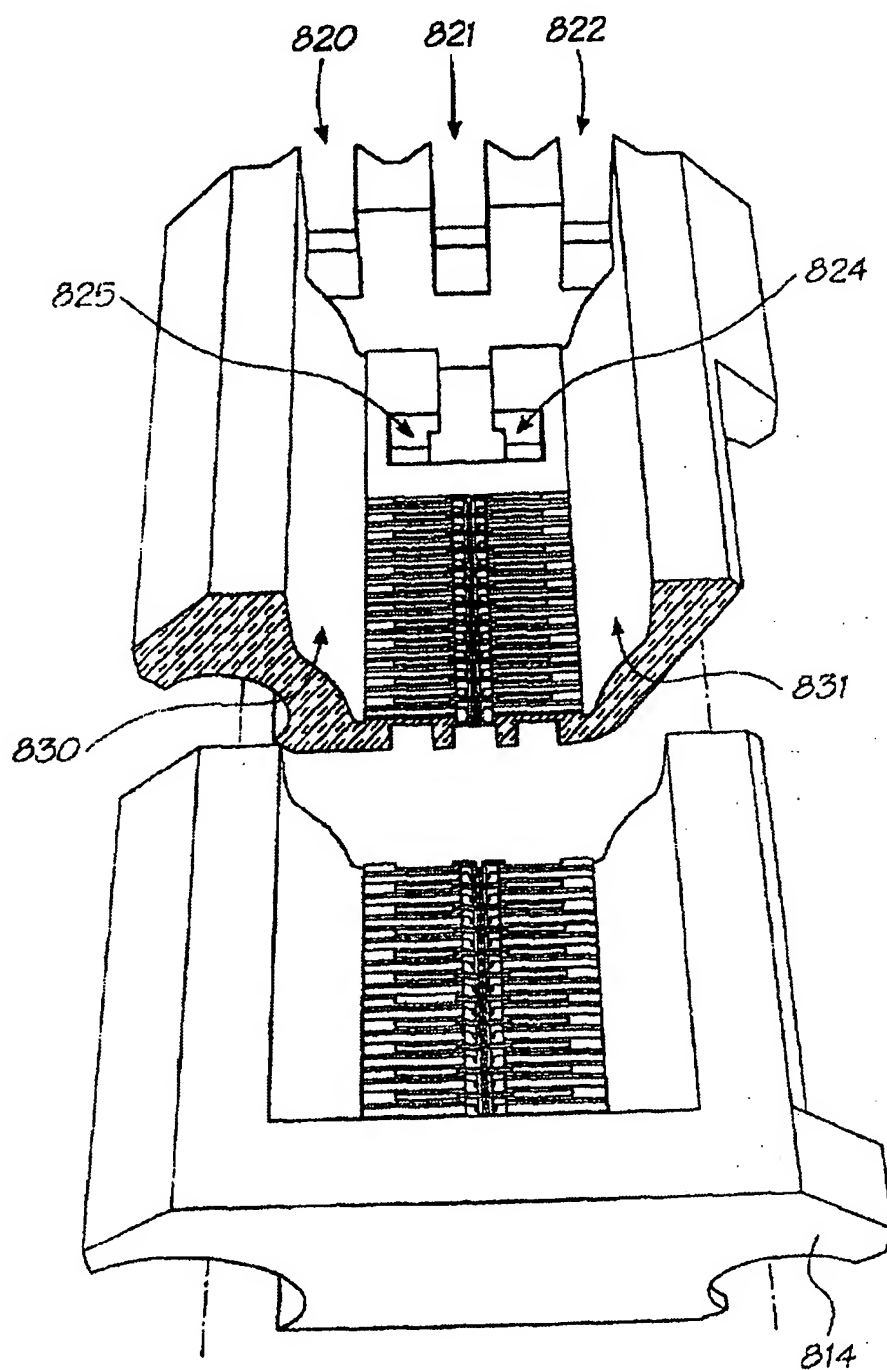


FIG. 209

U.S. Patent

Dec. 25, 2007

Sheet 129 of 149

7,312,845 B2

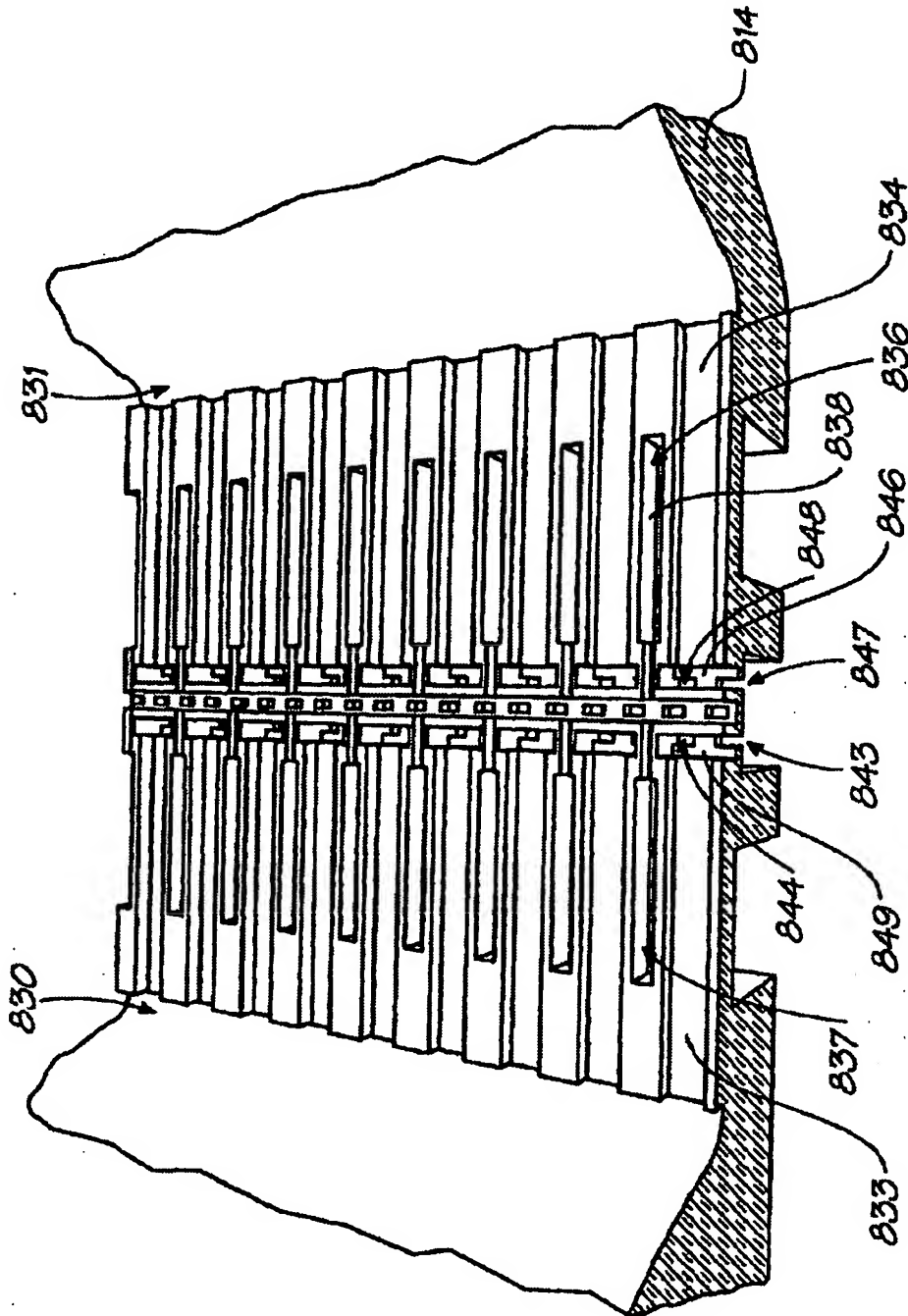


FIG. 210

U.S. Patent

Dec. 25, 2007

Sheet 130 of 149

7,312,845 B2

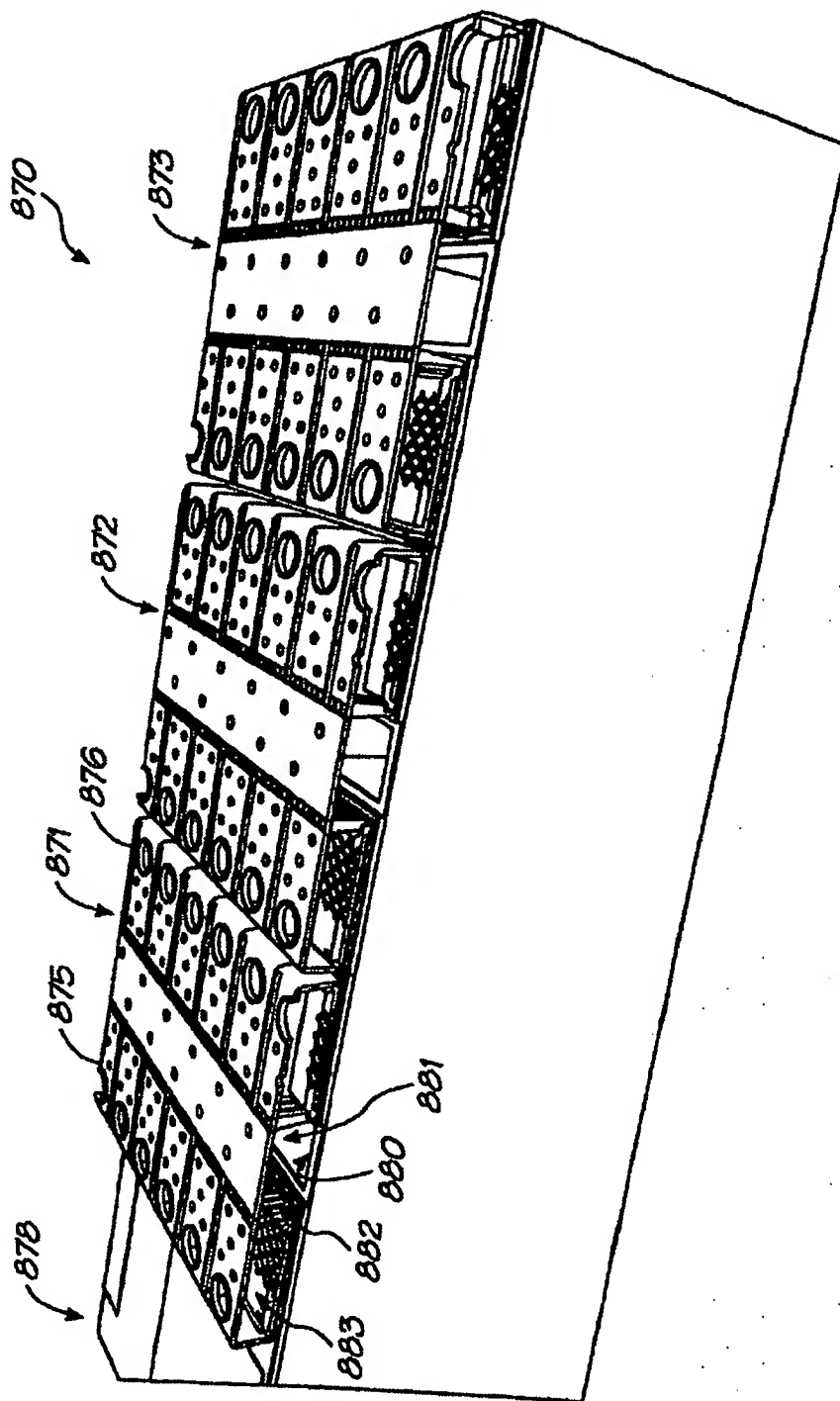


FIG. 211

U.S. Patent

Dec. 25, 2007

Sheet 131 of 149

7,312,845 B2

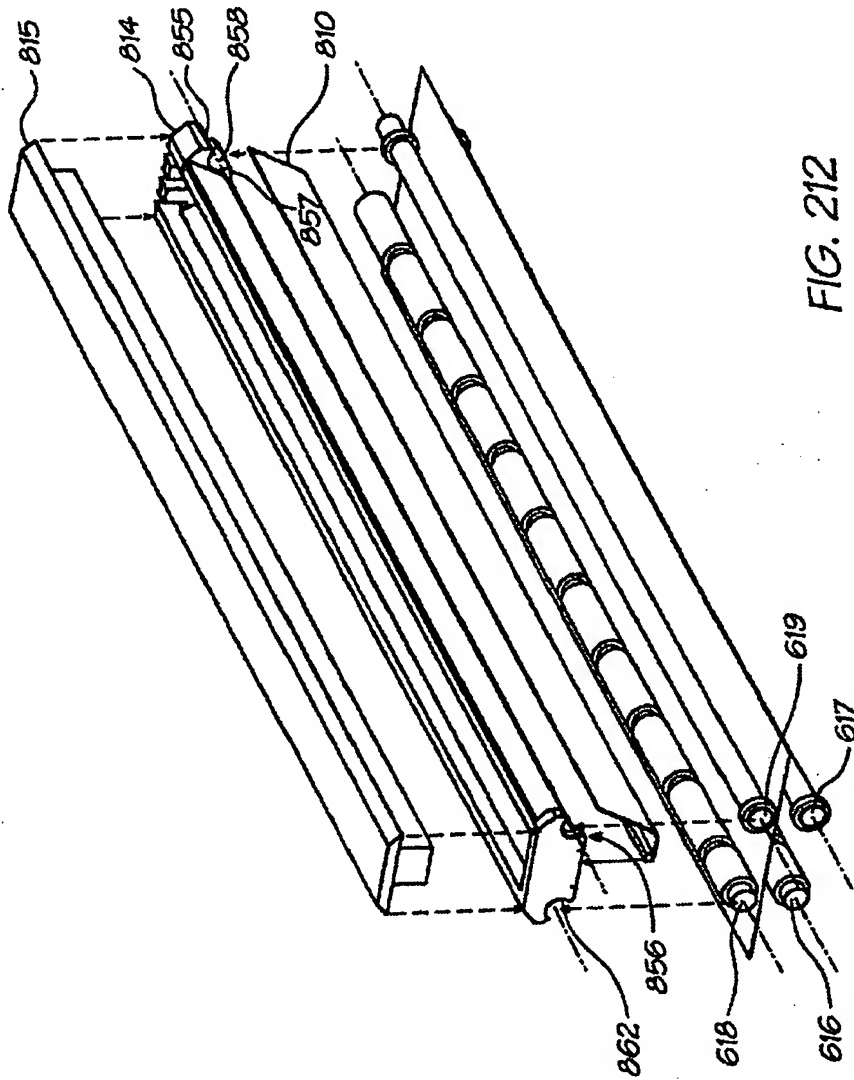


FIG. 212

U.S. Patent

Dec. 25, 2007

Sheet 132 of 149

7,312,845 B2

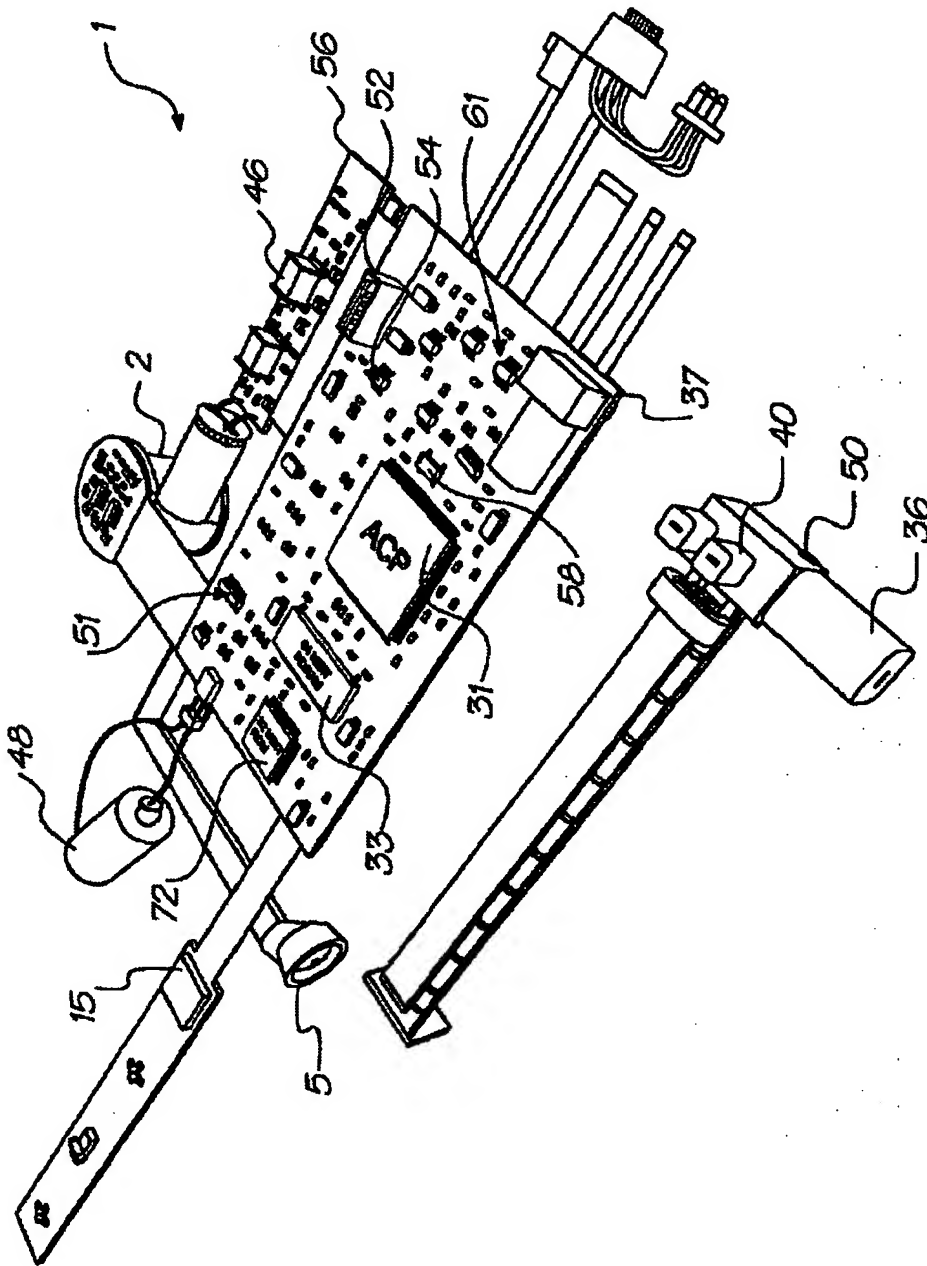


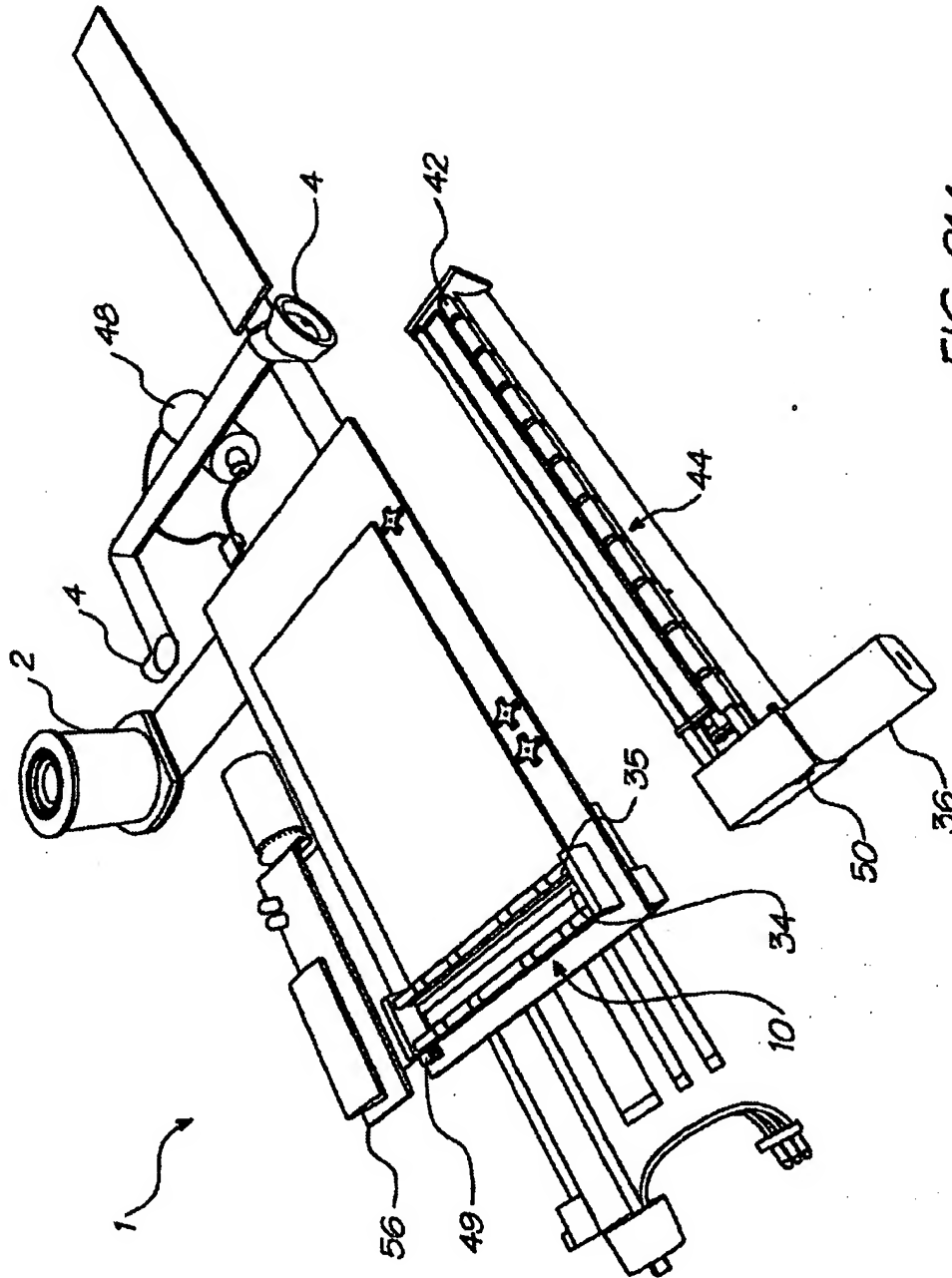
FIG. 213

U.S. Patent

Dec. 25, 2007

Sheet 133 of 149

7,312,845 B2

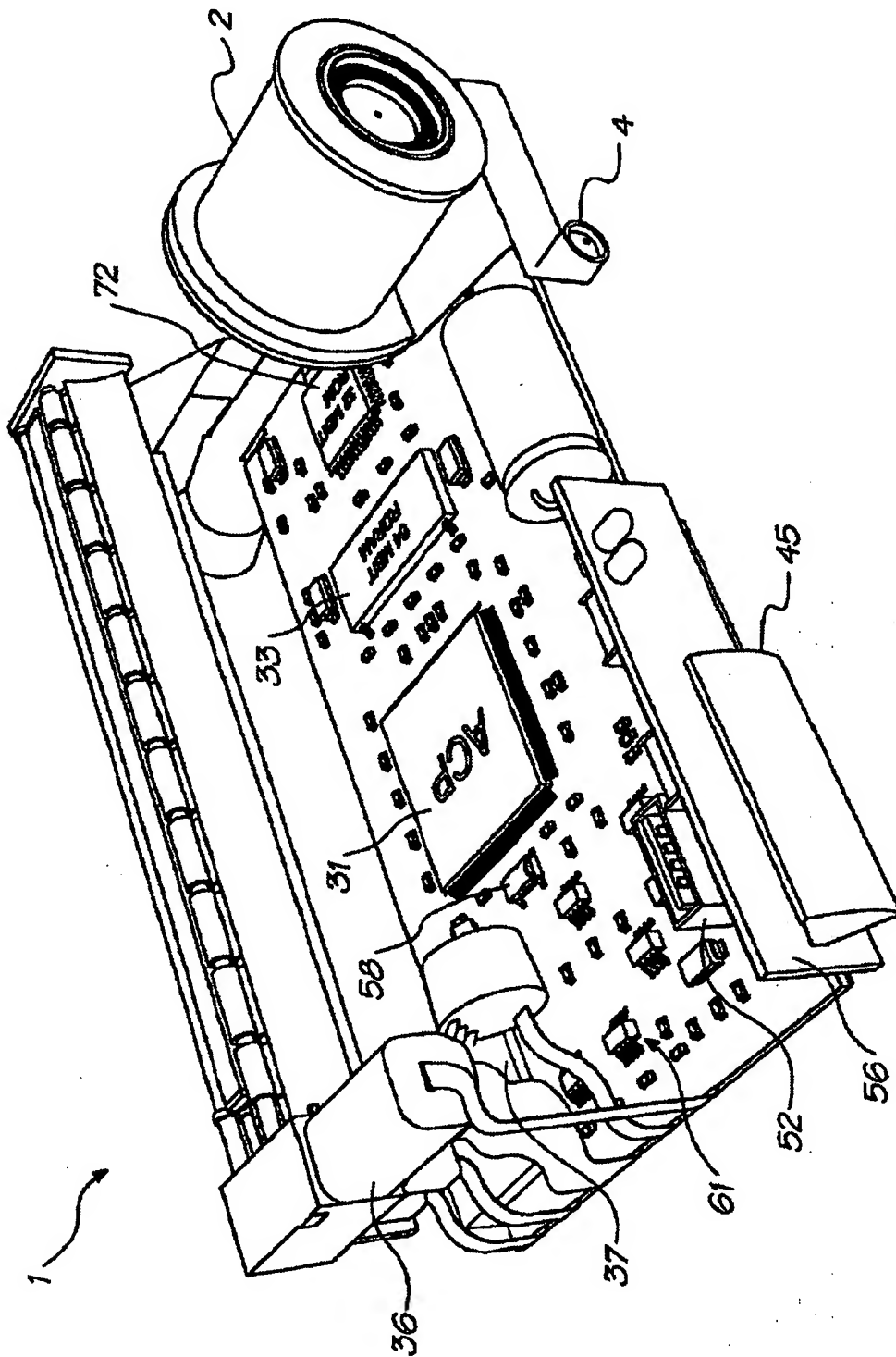


U.S. Patent

Dec. 25, 2007

Sheet 134 of 149

7,312,845 B2



U.S. Patent

Dec. 25, 2007

Sheet 135 of 149

7,312,845 B2

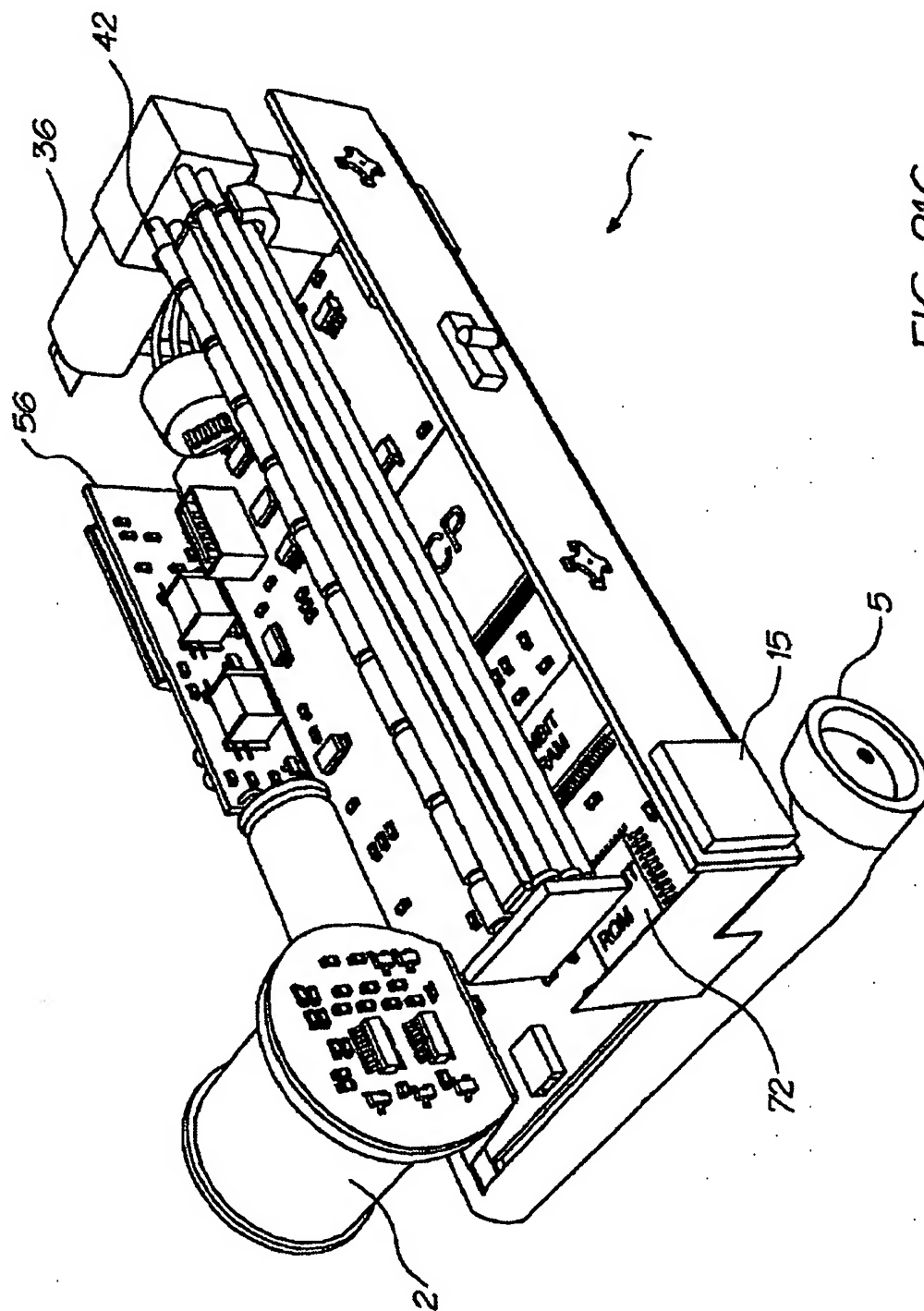


FIG. 216

U.S. Patent

Dec. 25, 2007

Sheet 136 of 149

7,312,845 B2

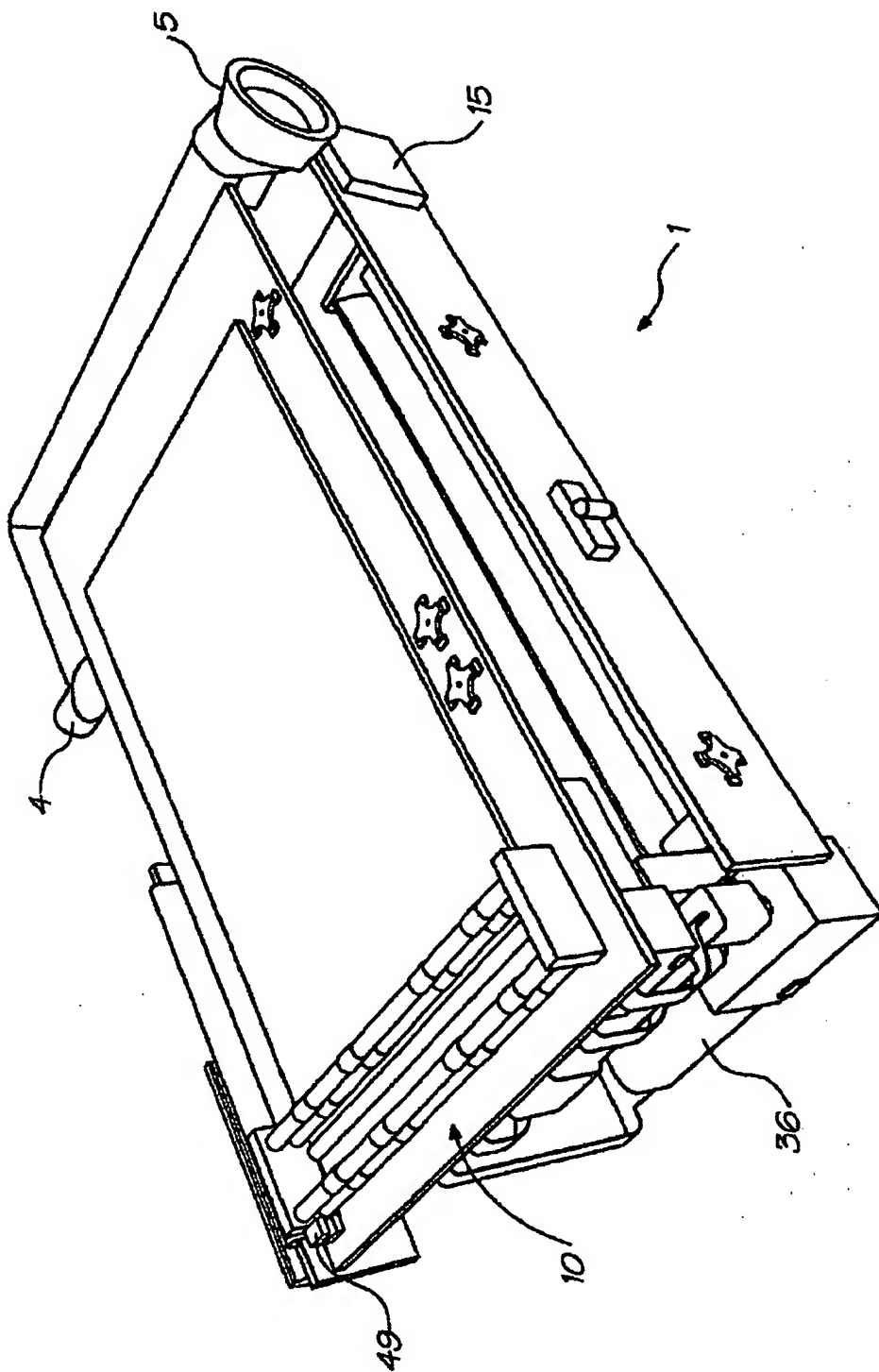
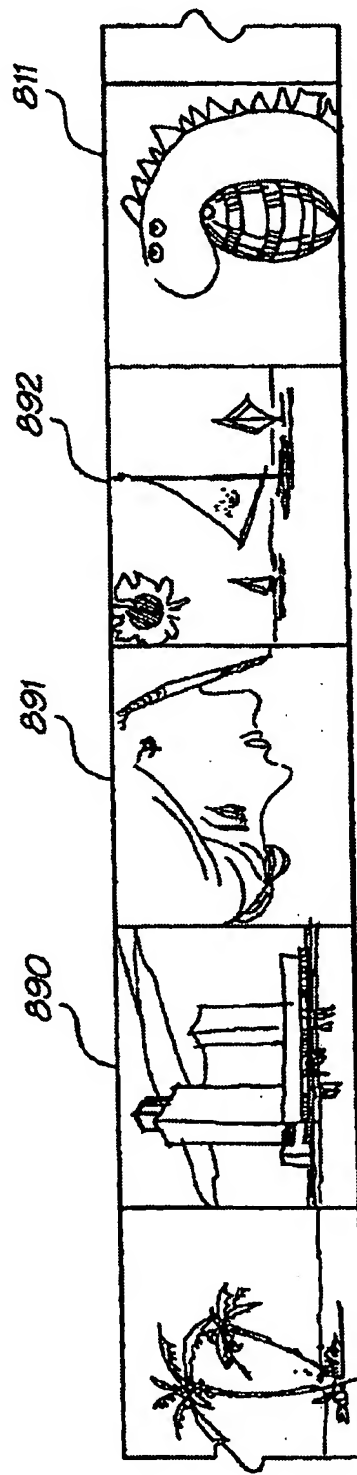
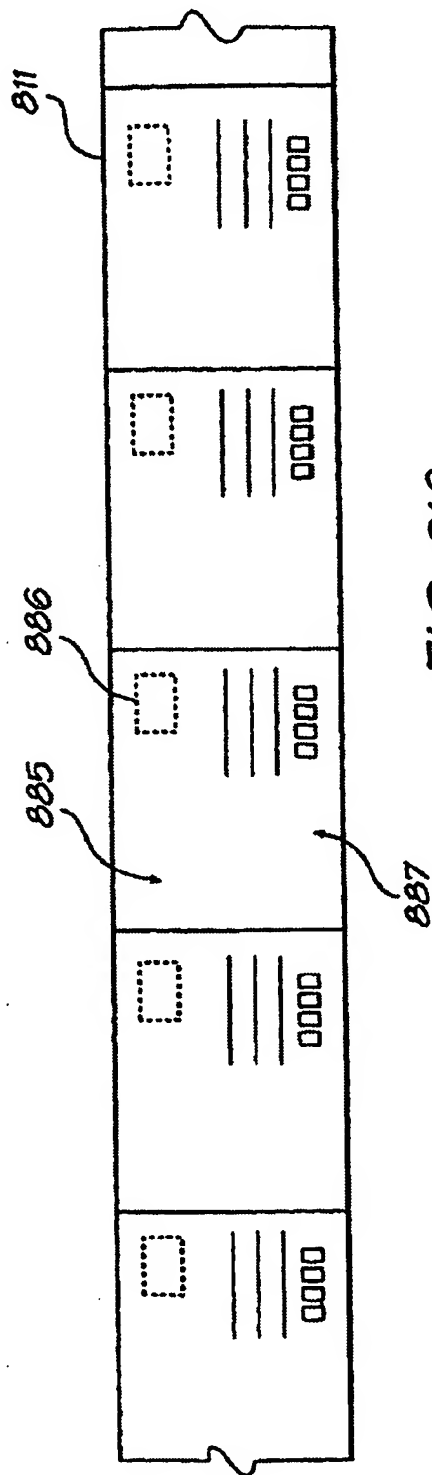


FIG. 217

U.S. Patent

Dec. 25, 2007

Sheet 137 of 149 7,312,845 B2



U.S. Patent

Dec. 25, 2007

Sheet 138 of 149

7,312,845 B2

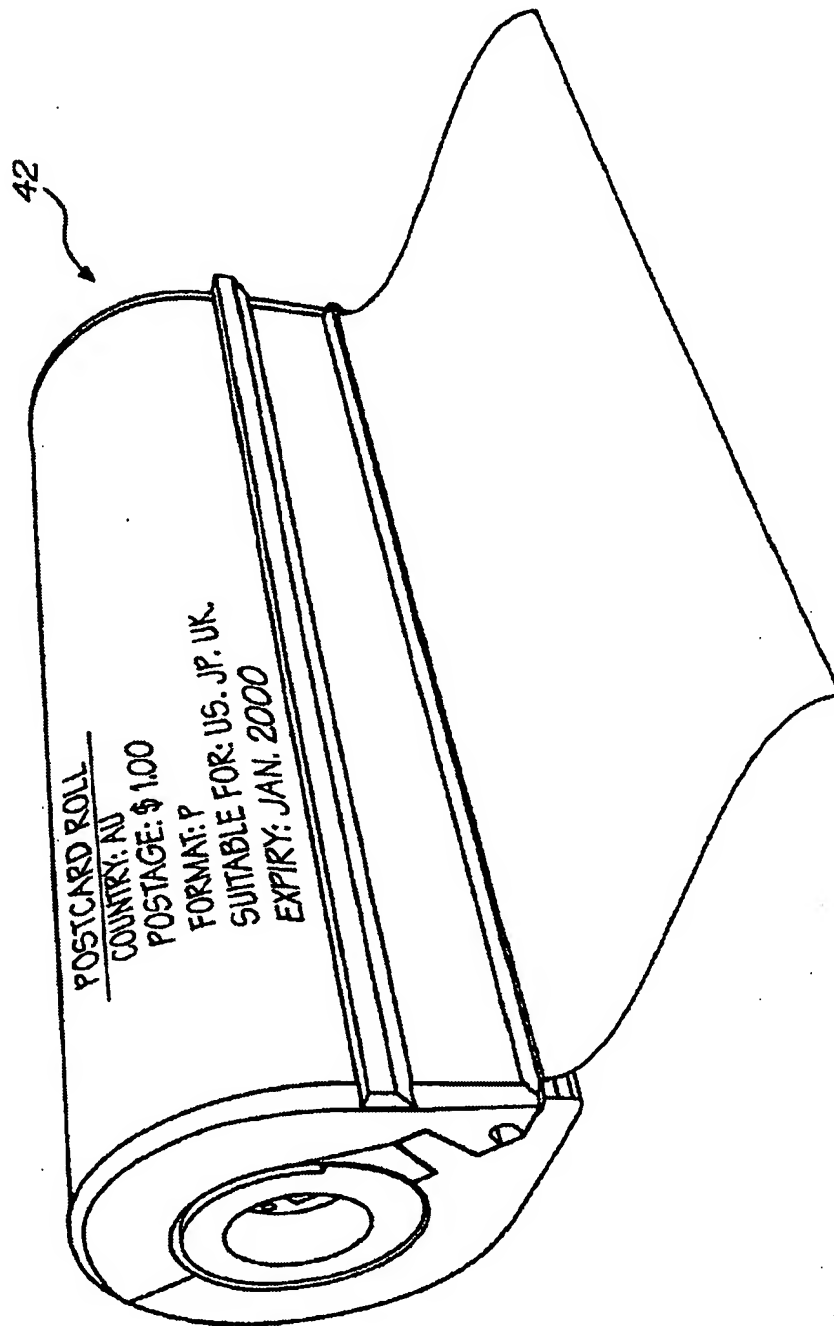


FIG. 220

U.S. Patent

Dec. 25, 2007

Sheet 139 of 149

7,312,845 B2

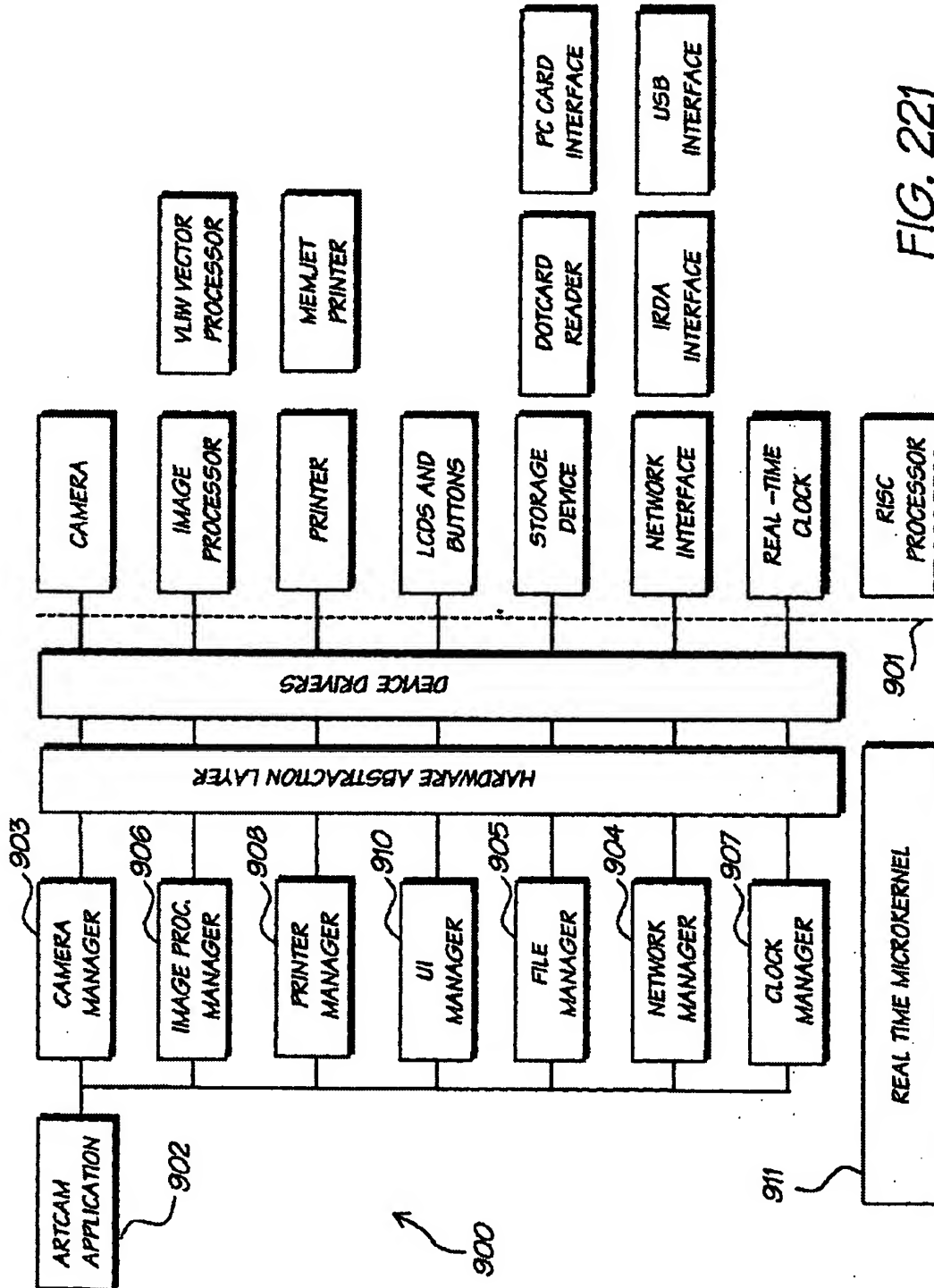


FIG. 221

U.S. Patent

Dec. 25, 2007

Sheet 140 of 149

7,312,845 B2

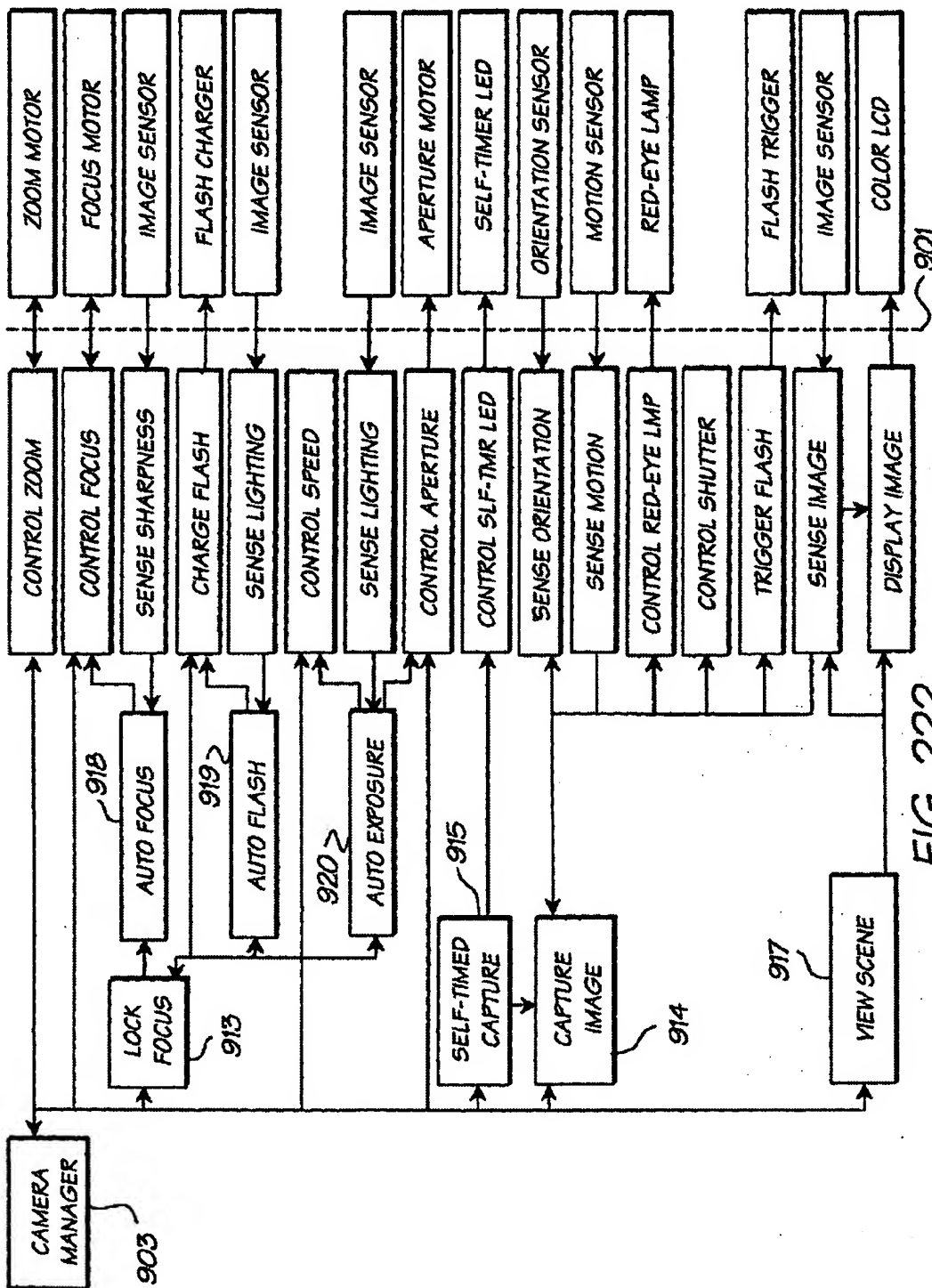


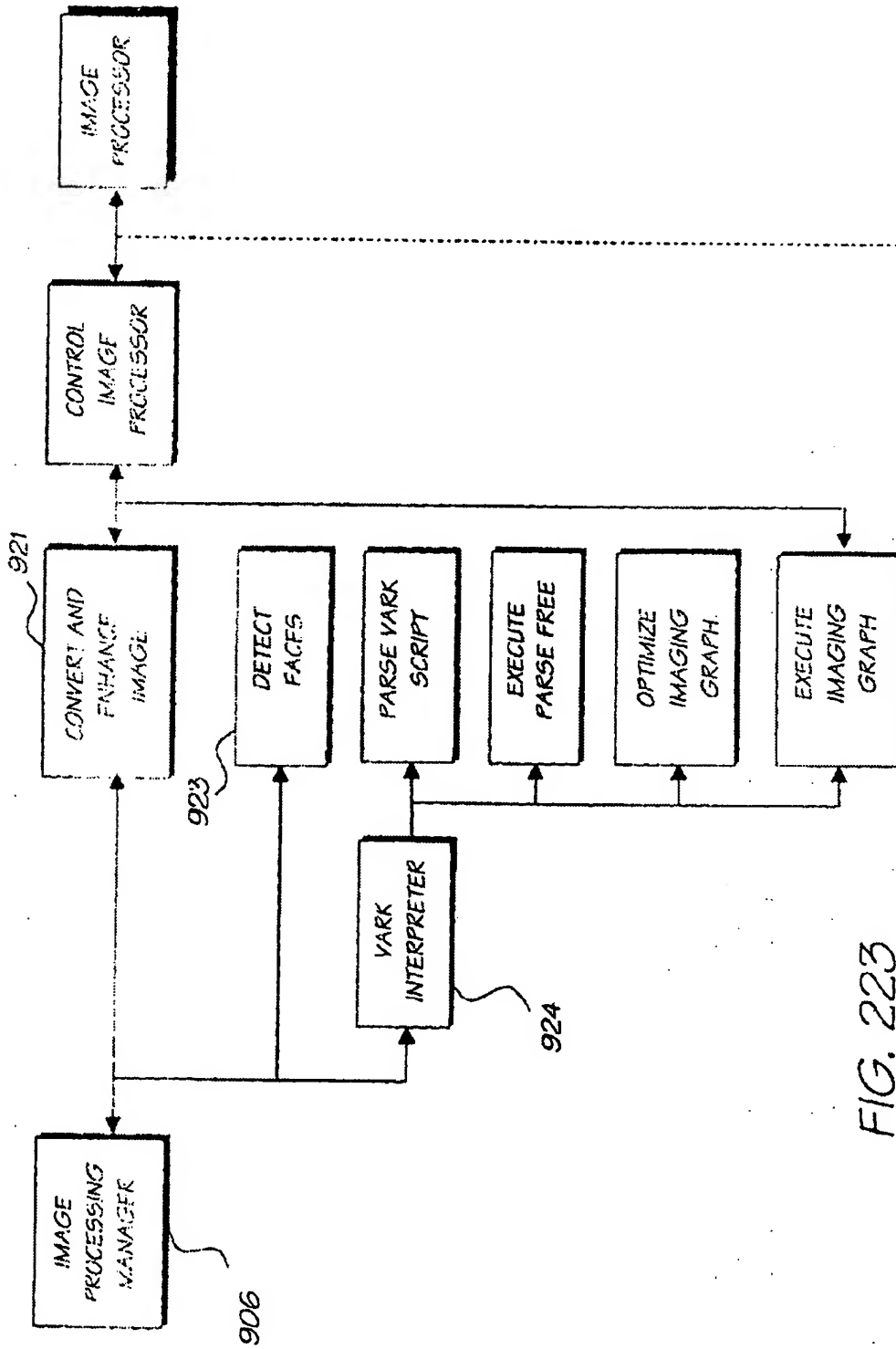
FIG. 222

U.S. Patent

Dec. 25, 2007

Sheet 141 of 149

7,312,845 B2



U.S. Patent

Dec. 25, 2007

Sheet 142 of 149

7,312,845 B2

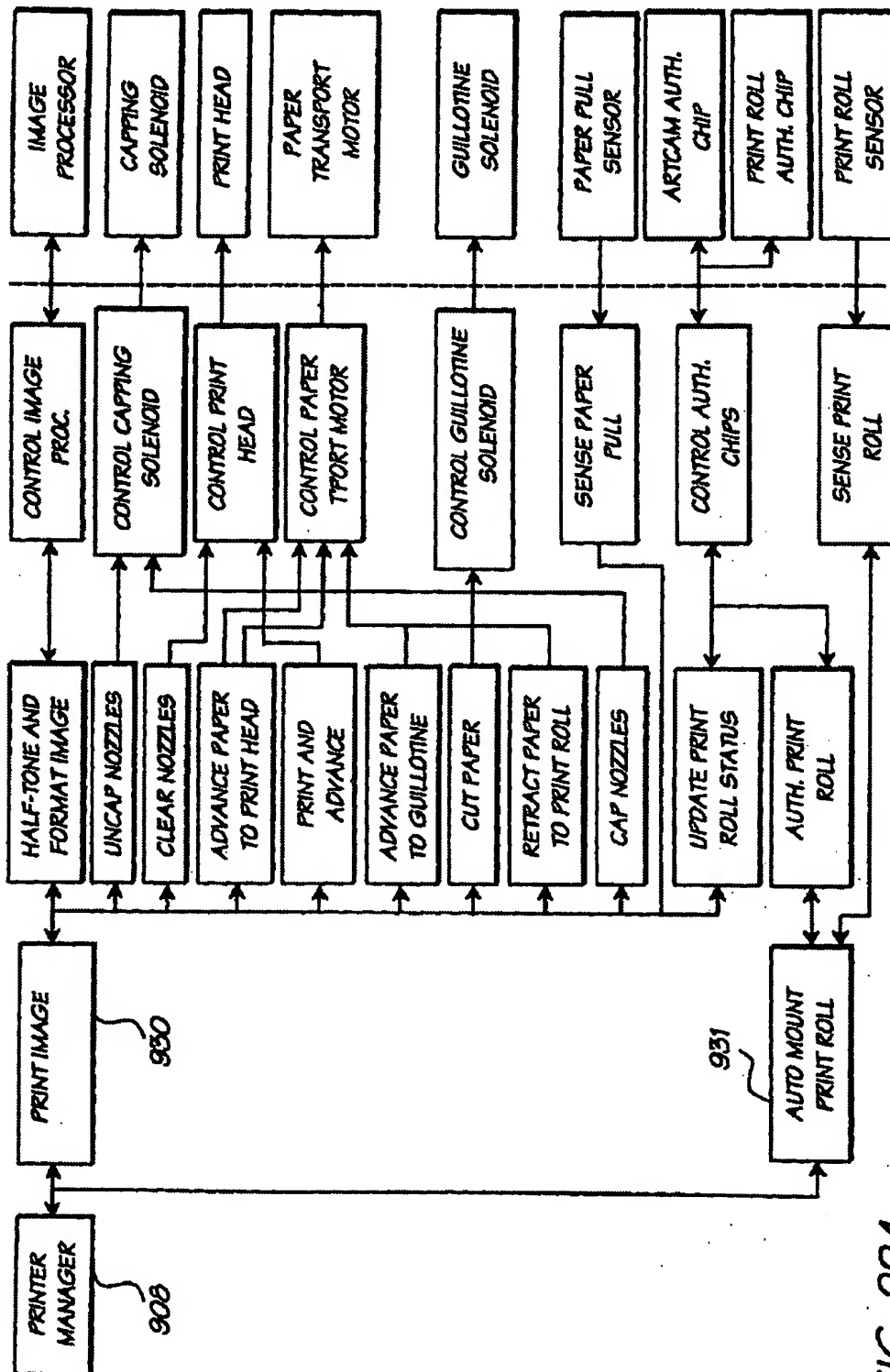


FIG. 224

U.S. Patent

Dec. 25, 2007

Sheet 143 of 149

7,312,845 B2

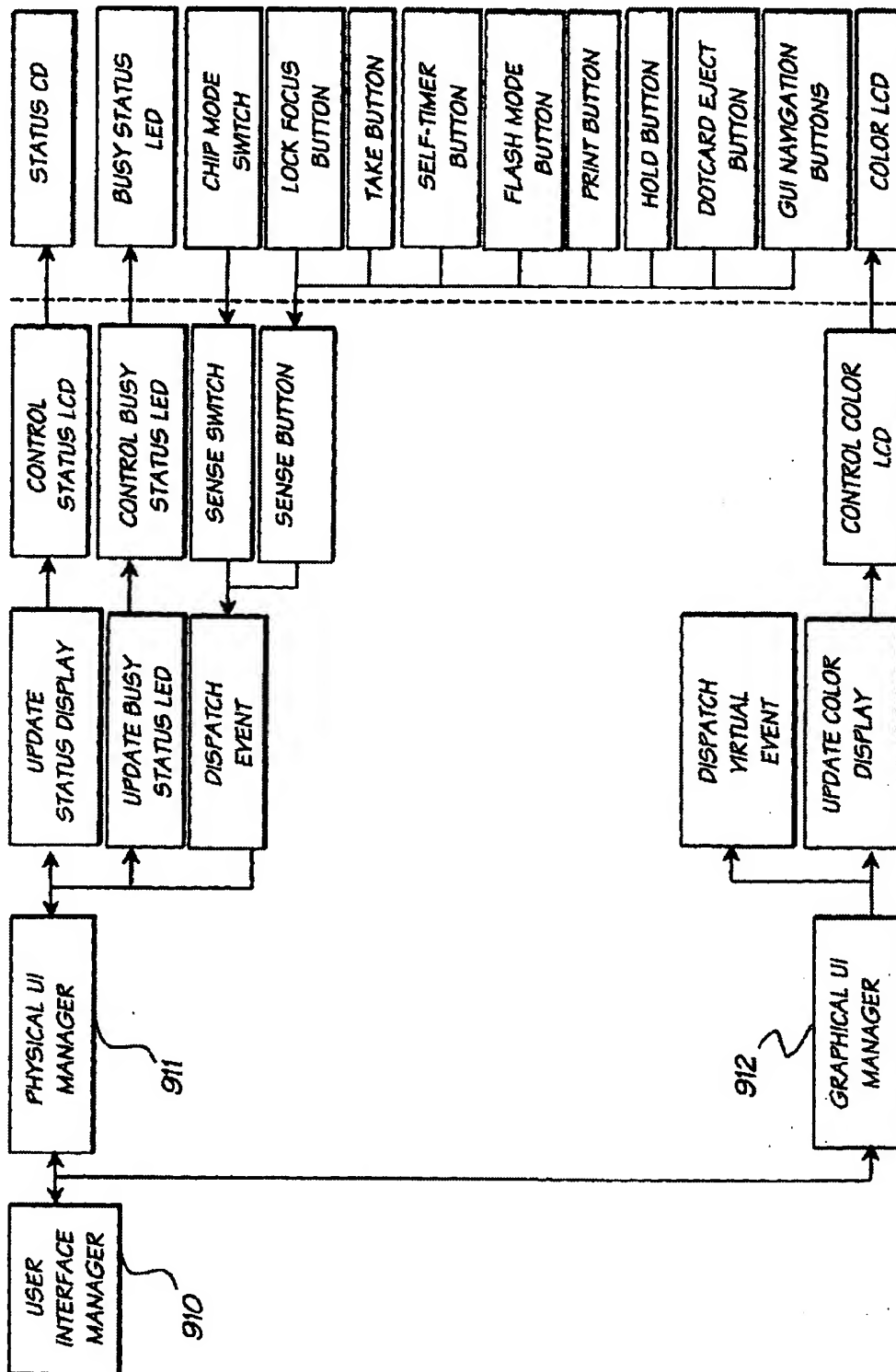


FIG. 225

U.S. Patent

Dec. 25, 2007

Sheet 144 of 149

7,312,845 B2

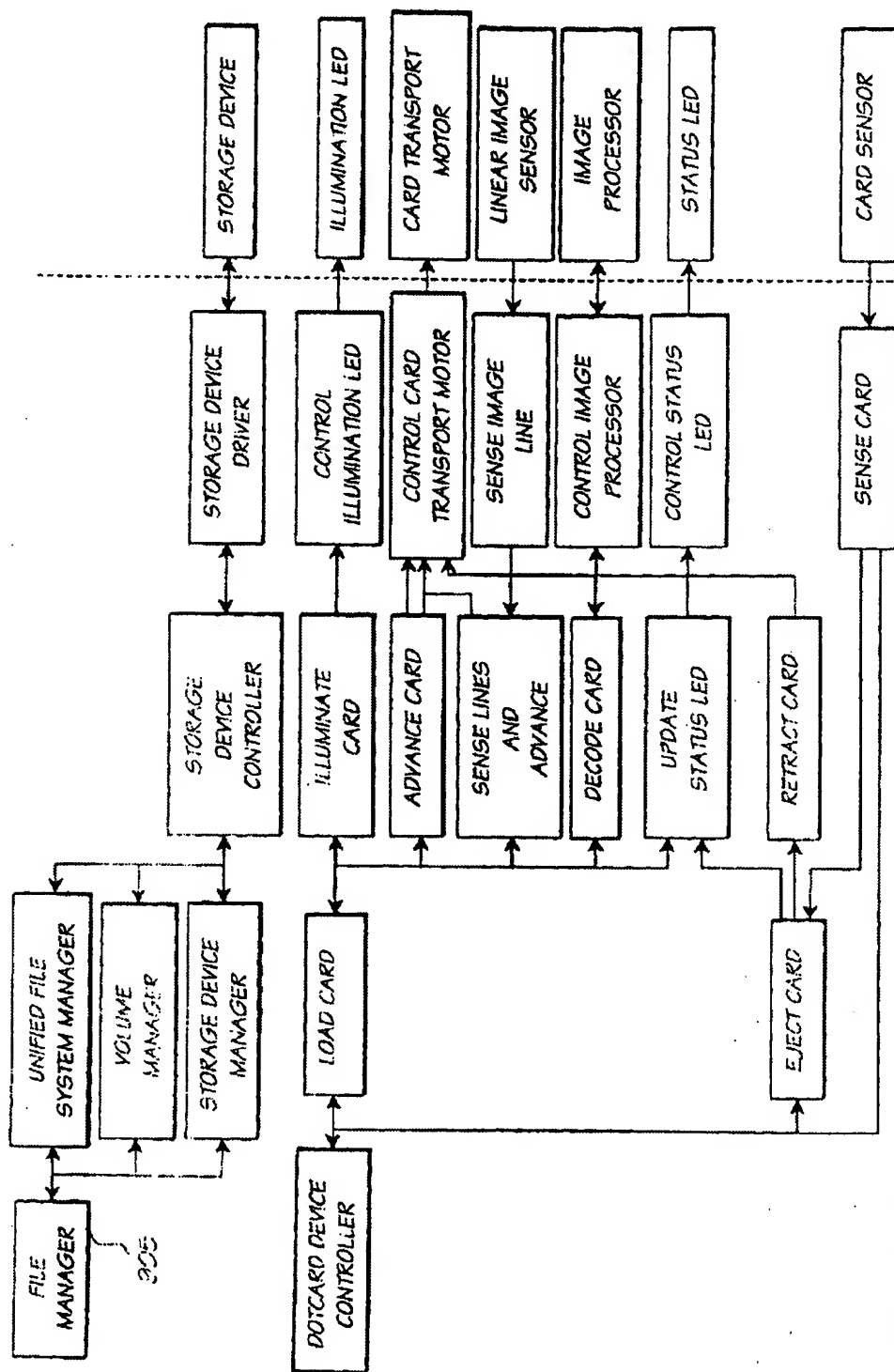


FIG. 226

U.S. Patent

Dec. 25, 2007

Sheet 145 of 149

7,312,845 B2

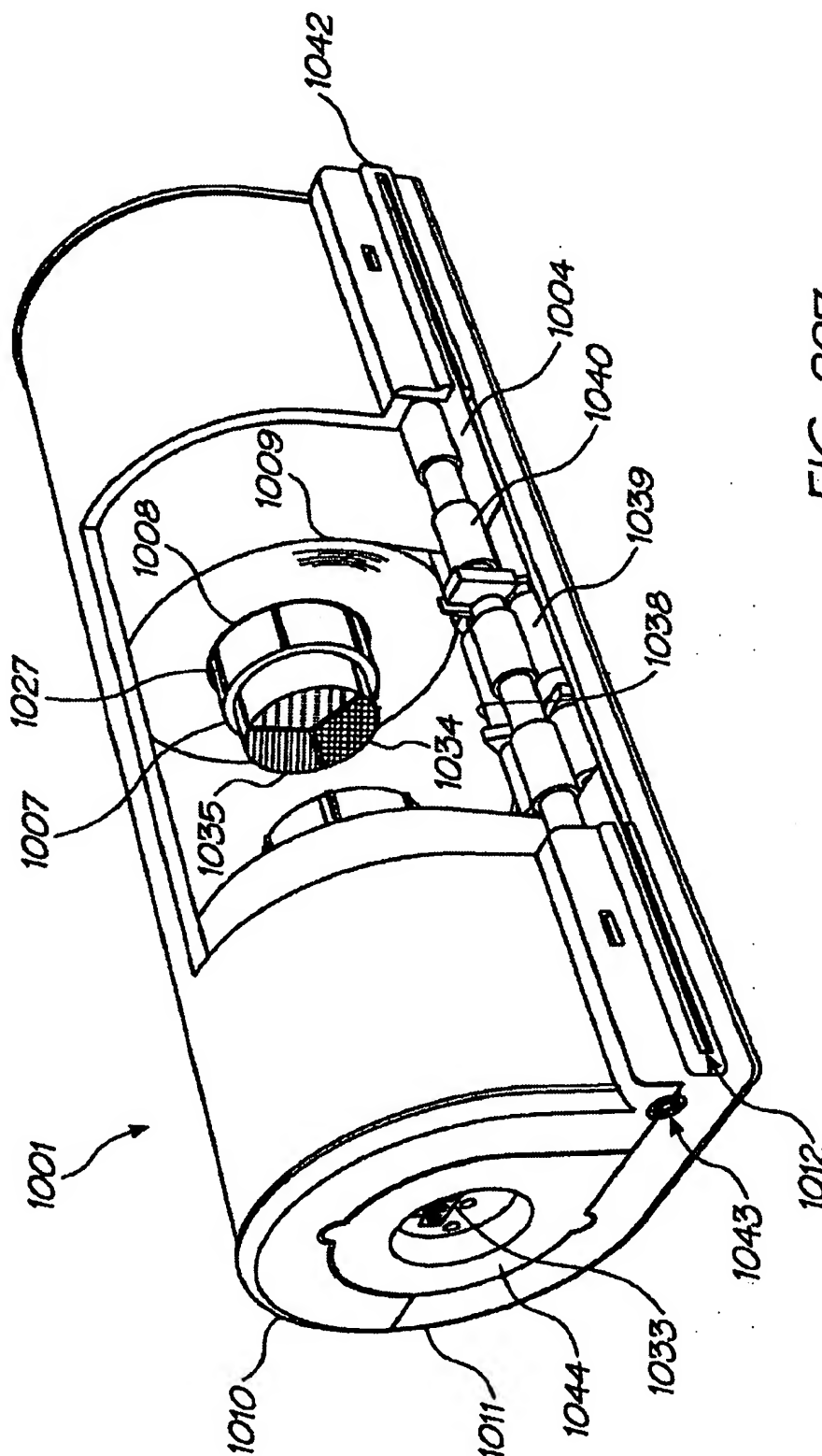


FIG. 227

U.S. Patent

Dec. 25, 2007

Sheet 146 of 149

7,312,845 B2

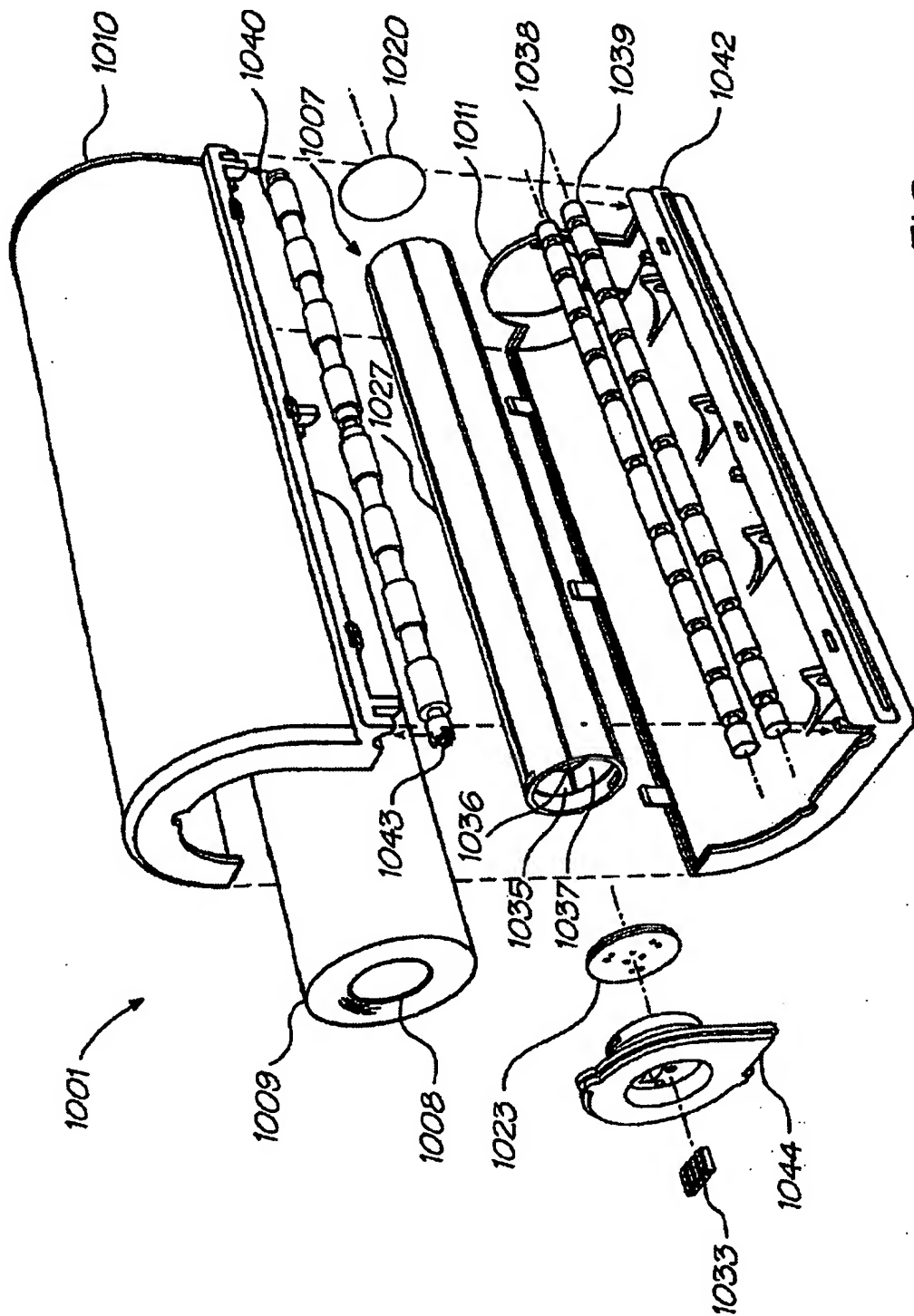


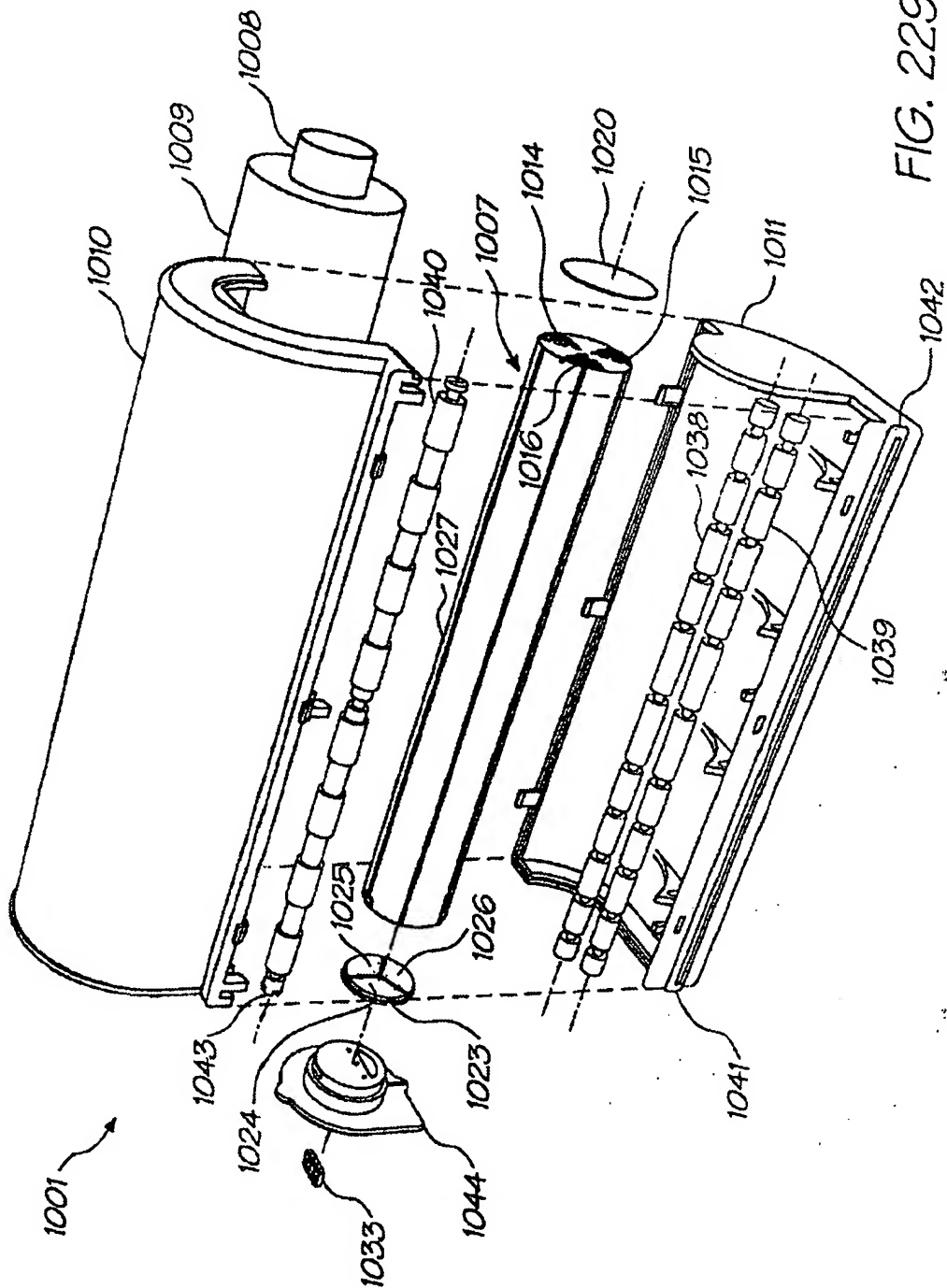
FIG. 228

U.S. Patent

Dec. 25, 2007

Sheet 147 of 149

7,312,845 B2



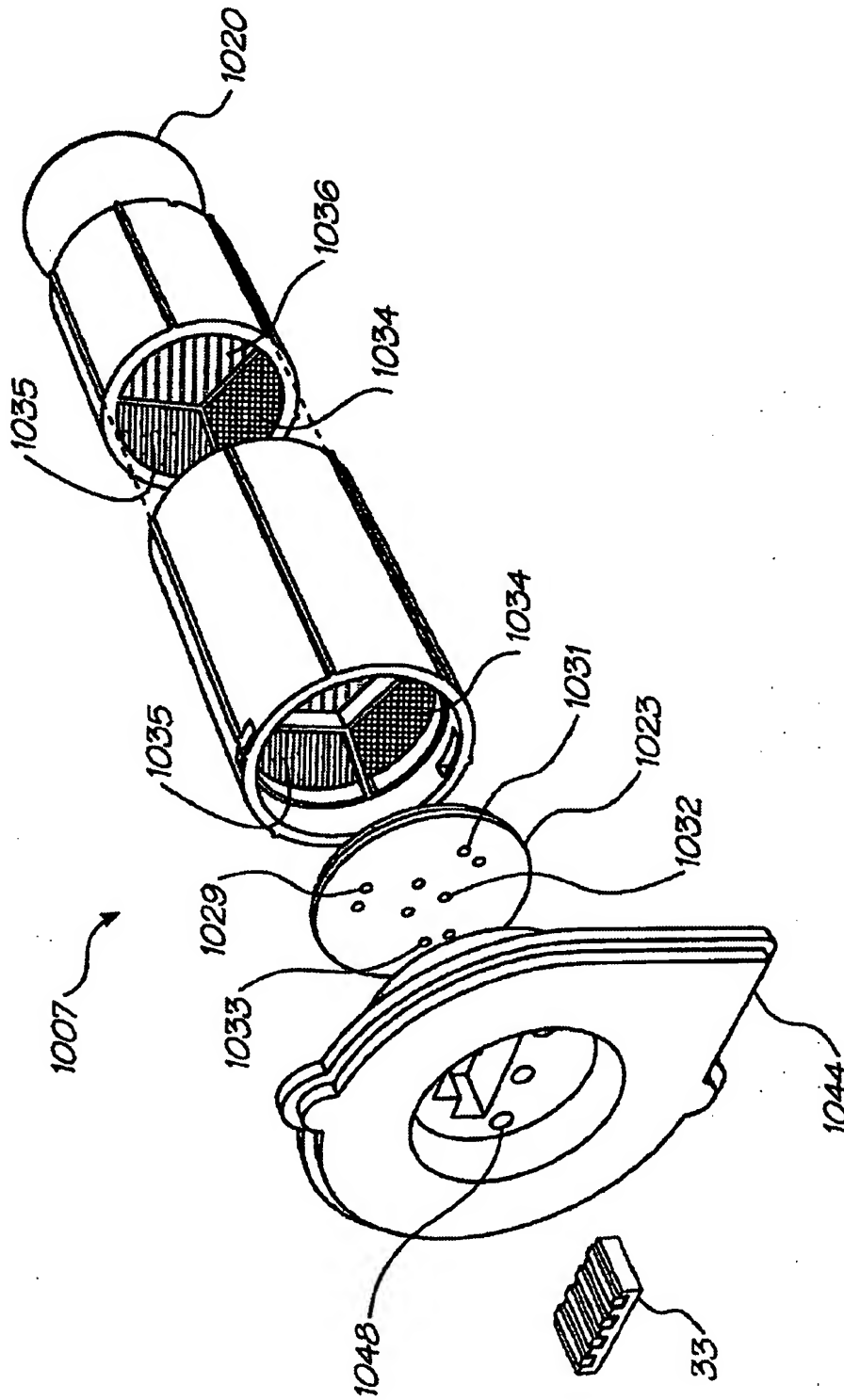


FIG. 230

U.S. Patent

Dec. 25, 2007

Sheet 149 of 149

7,312,845 B2

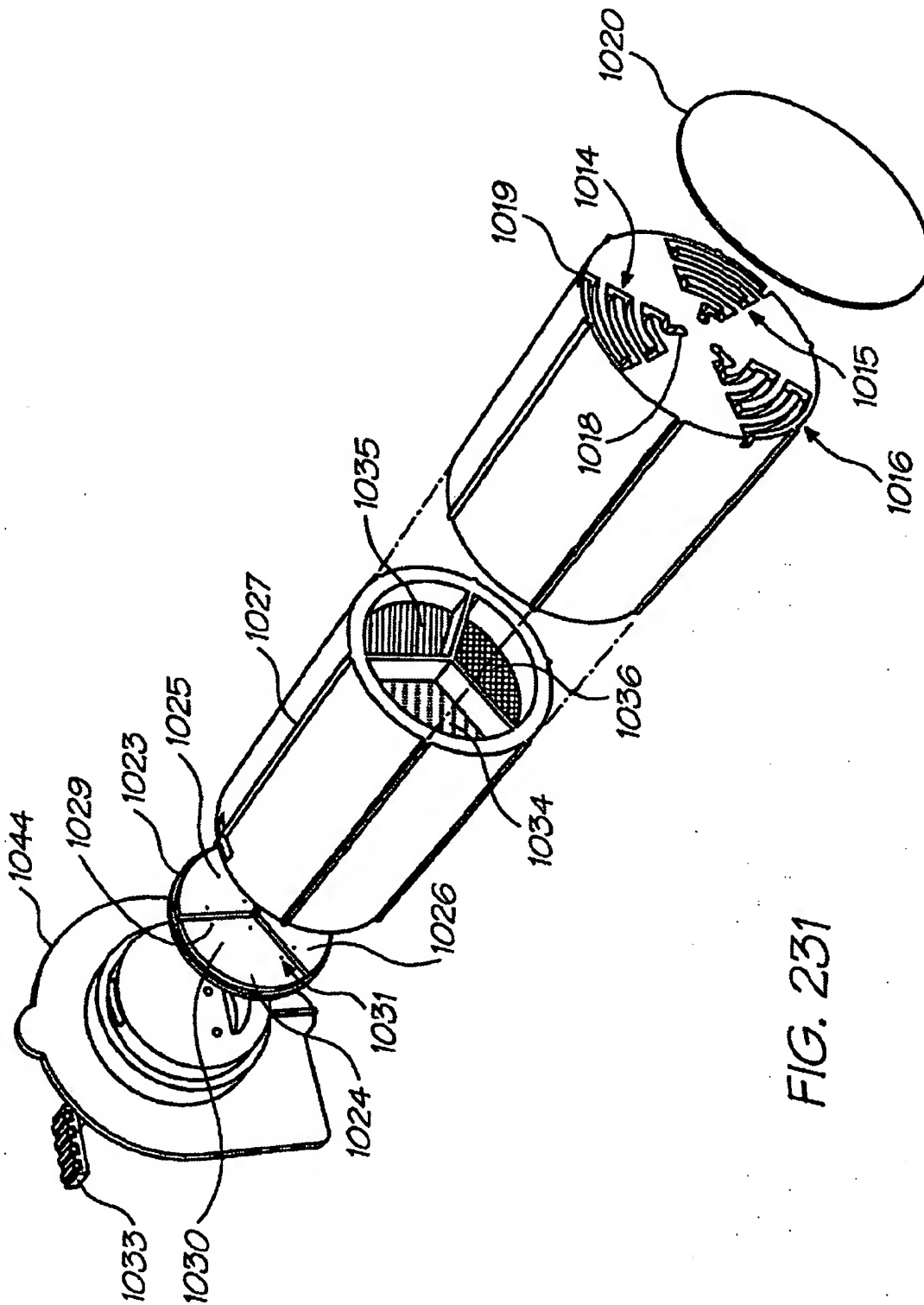


FIG. 231